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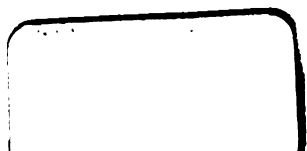
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ARCHIVES OF OPHTHALMOLOGY

EDITED IN ENGLISH AND GERMAN

BY

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OF NEW YORK

AND

DR. C. SCHWEIGGER
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VOLUME XII.

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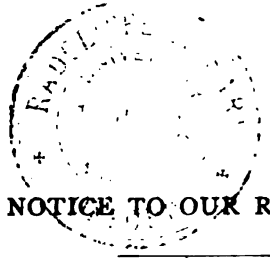
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The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

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The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

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ARCHIVES OF OPHTHALMOLOGY.

REFRACTION IN THE PRINCIPAL MERIDIANS OF A TRIAXIAL ELLIPSOID, WITH REMARKS ON THE CORRECTION OF ASTIGMATISM BY CYLINDRICAL GLASSES; AND AN HISTORICAL NOTE ON CORNEAL ASTIGMATISM.

By SWAN M. BURNETT, M.D., OF WASHINGTON.

WITH A COMMUNICATION ON THE MONOCHROMATIC ABERRATION OF THE HUMAN EYE IN APHAKIA.

By PROF. WM. HARKNESS,

U. S. NAVAL OBSERVATORY, WASHINGTON.

IN considering refraction in the principal meridians of an ellipsoid with three unequal axes, as we have it in regular corneal astigmatism, all the writers with whom I am familiar—including Helmholtz, Knapp, Donders, Aubert, Fick, and Mauthner—have tacitly assumed that the refraction in these two meridians was free from monochromatic aberration.

It seemed to me, however, that as these meridians have radii which, from the nature of the curved surface, change their length at each successive point, we must have a refraction differing in some respects from the spherical.

As the matter is one very easily and simply settled by construction, I have endeavored to determine the character of such aberration.

We have, of course, from a purely optical point of view, two cases to deal with: one in which the light falls on the sharper end of the ellipsoid, or in the direction of the long axis; and one in which the light falls on the flatter end, or in the direction of the short axis.

—in accordance with this theorem. Let ab represent the major axis of the ellipse of which bp is a portion; from a as a centre and ab as a radius, draw the segment rs of a circle. Let v and y be the rays parallel to the axis and incident at k and i . Through the points k and i , draw lc and nd perpendicular to ab . These will cut the circle at q and ϕ , and the normals at these points coincide with lines drawn through them and the centre a ; and the lines xu and jt drawn at right angles to these normals, will be the tangents at the points q, ϕ . Now, if the circle and ellipse have the same subtangents bu and bt , then the lines su and wt , drawn through u and k and t and i must be the tangents to the ellipse at the points k and i , and the lines mf and oe , drawn perpendicular to them, must be normals to the surface at the points of incidence, k and i . We have now all the requisite data, and have only to apply the law of sines in order to find the course of the rays ig and kh . In this case, in order to have the diagram fall within reasonable limits, we have assumed a refractive index = 3.

It will be seen at a glance that in the case where the rays fall parallel to the long axis of the ellipse, the ray iy , nearer the axis, crosses the principal axis, au , after refraction, in front of the more peripheral ray kv ,—that is to say, we have an aberration the opposite in kind to that of an ordinary spherical surface.

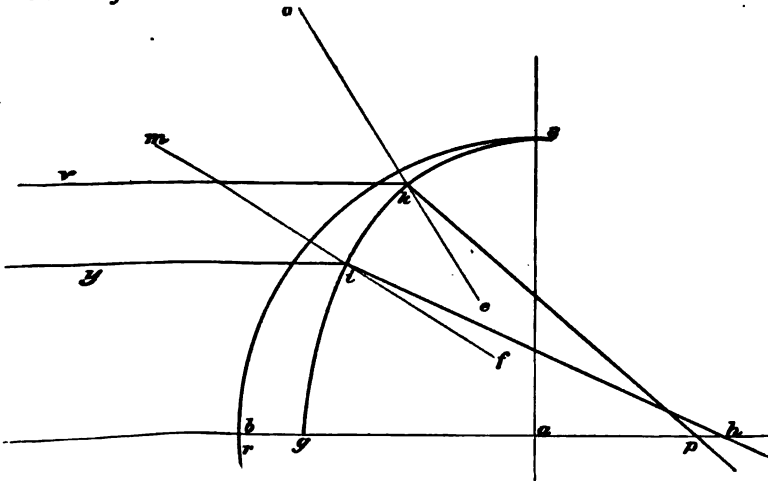


FIG. 2.

If, however, the light falls on the ellipse in the direction of the short axis, or on the blunter end, as we have it represented in fig. 2 (which has been constructed according to the same plan as fig. 1), we find that the more peripherally refracted ray kp crosses the principal axis in front of the more centrally refracted ray ih ; in other words, we have an *excess of the ordinary spherical aberration*.

It therefore becomes evident, *that if we take a series of curves passing over from the flatter to the sharper end of an ellipse, we will have in the refraction, first, an exaggeration of the spherical aberration—which will be greater in proportion to the difference in the length of the major and minor axes—diminishing until the curve becomes a circle, when there will be only the ordinary amount of spherical aberration; then, as the minor axis becomes shorter, this aberration will still further diminish until it becomes for any chosen rays practically zero. As the minor axis still further shortens, the aberration passes over to an opposite kind, and the more central rays cross the principal axis in front of the more peripheral, and this will increase PARI PASSU with the shortening of the minor axis.*

In applying these principles to the eye, some interesting facts in regard to the retinal images of astigmatics and the influence of cylindrical lenses on this anomaly are made manifest.

In the first place, it is evident that a deviation of the cornea from the spherical form need not necessarily be injurious to distinctness of the retinal image. On the contrary, should it assume the form of the sharper end of an ellipsoid of revolution and the major and minor axes bear a certain ratio to each other, the monochromatic aberration would be practically abolished, a circumstance which would add much to the sharpness of the retinal image. Of how far this is true of the actual cornea, Prof. Harkness will speak in his communication.

If, however, this ratio between the major and minor axes is varied from in either direction, a monochromatic aberration is at once manifest, and for the relief of such an aberration (we are supposing now that the ellipsoid is one of revolution, and all the meridians are alike) no ordinary

cylindrical or spherical glass can be of any benefit. It is possible that some cases of amblyopia which are benefited but little or not at all by either spherical or cylindrical glasses, and where the nervous apparatus seems intact, fall in this category. We look upon some forms of conical cornea as exaggerated examples of this condition.

Where the cornea, as it usually does, represents a triaxial ellipsoid, we will have a different set of conditions according to the character of the curvature; and the action of cylindrical lenses on the refraction in the principal meridians will not be uniform in all cases.

Let us take, as an example, that form in which the cornea represents the sharper end of an ellipsoid with three unequal axes. It is plain from what has gone before, that the meridian of greater curvature, after it has passed a certain point, will suffer from the greater aberration. *A* in fig. 3 represents the meridian of less, and *B* the meridian of greater curvature. In *A*, the peripheral ray *d* crosses the principal

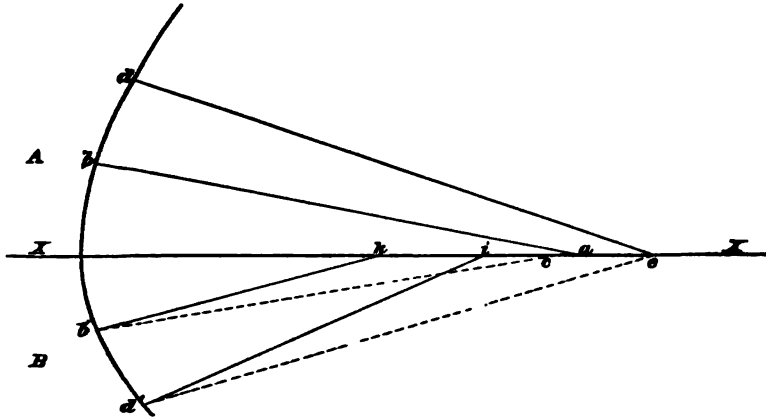


FIG. 3.

axis xx' at e and the more central ray b at a , while in *B* the ray d' crosses at i , and b' at k . If now we place a cylindrical lens before the refracting surface with its curvature corresponding to the meridian *B*, and of such strength that the peripheral ray d' is carried back and made to cross the axis in the same point e as the peripheral ray d of the meridian *A*, the relation between k and i , though they are carried

back from their original position, remains unaltered at c and e , since the regular refraction of the cylinder does not counteract the aberration of the elliptical surface. The result would be that the rays crossing at a and c , would form figures of diffusion on the focal plane passing through e .

If we bring the more peripheral rays, d and d' , of the two meridians, A and B , to cross at the same point c , moving them forward from a , *i*, as in fig. 4, we have the same condition; for the central rays b , b' , which cross the axis at o and k , would form figures of diffusion on the focal plane passing through c .

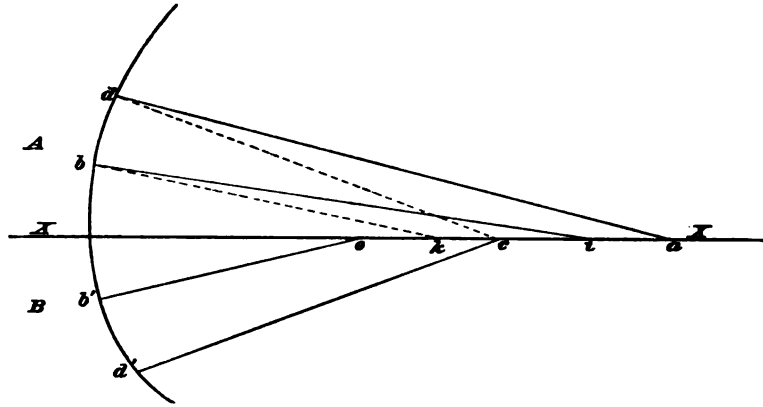


FIG. 4.

We would have, of course, an analogous state of affairs in dealing with the blunter end of the ellipsoid; for while it would be possible, by means of a cylindrical lens, to bring corresponding peripheral or central rays to cross the axis at the same point, it would not be possible to bring *both* the central and peripheral rays to cross it in one point; and if we should have to deal with a surface in which one meridian represented the blunter end of an ellipse, while the other represented the sharper end, the diffusion figures would be still more confusing. Fig. 5 represents such a surface where the peripheral rays, d , d' , are brought, by means of a cylinder, to cross the axis at the same point e .

The more central ray b of the flatter ellipse A , will cross the axis at c , *behind* the focal plane, passing through e , while

the more central ray b' of the sharper ellipse B , will cross it *in front* at a , thus forming two sets of diffusion figures.

Under any of these forms, which the cornea may assume,¹

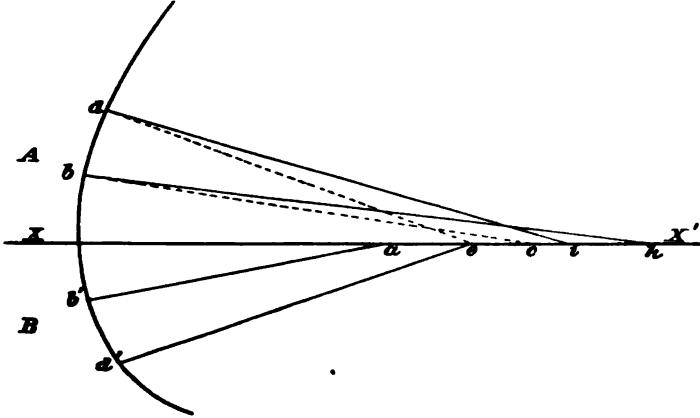


FIG. 5.

the retinal image must have its distinctness of outline impaired by the circles of diffusion which fall on it.² This diffusion being greater in the higher than in the lower forms of astigmatism, we should expect to find the visual acuteness, after all possible correction, less in the former, and such I believe is the experience of all practitioners. We should also expect that the vision of astigmatics, after correction, would be less than that of myopes and hypermetropes of the same grade after their neutralization by spherical lenses.

As a matter of statistics, I find that out of about 2,000 astigmatic eyes of all degrees, only about $\frac{1}{10}$ have $V = 1$, after the best possible correction.

It must also be apparent that this aberration in the principal meridians will be greater the greater the angular aperture—which in the eye would be represented by the pupil,—and consequently the larger the pupil the larger the

¹In all the measurements that have been made up to the present time, the cornea has never been found to assume in either of its meridians the form of the blunter end of an ellipse; but we see no reason to doubt the *possibility* of such an occurrence.

²We do not take into consideration here the rays passing through the intermediate meridians. These require a separate investigation.

figures of diffusion, and the more indistinct the image. It is for this reason, among others, that in examining for the presence, and particularly the degree of astigmatism, I always abstain, except on rare occasions, when I have the strongest reasons to suspect the presence of spasm of accommodation, from dilating the pupil. I know it has become the fashion, which has quite a large following, to paralyze the accommodation (and at the same time, of course, dilate the pupil) in the examination of almost every case of refractive anomaly, and especially where astigmatism is suspected. One principal argument against this is, that when the eye is under the influence of a mydriatic, it is not in its normal condition, and glasses fitted to such an eye may not, and as a matter of my experience usually do not, at all suit it when the effects of the mydriatic have passed away. To say nothing of the sources of error due to the enlarged pupil, there is a greater or less amount of tension of the ciliary muscle, normal to every eye, which disappears under the mydriatic, and gives the eye a refraction below that which it will have when it returns to its natural state.

Furthermore, I think, judging from my own experience, that spasm of accommodation is not common in astigmatism; because, except in the compound hypermetropic form, no benefit can accrue from such spasm.¹ It would be impossible for any amount of contraction of the ciliary muscle in its totality to overcome the difference in the refraction in the two meridians so as to give clear and distinct vision. If, however, a mydriatic is used, it is always wise to wait until the pupil has regained its normal size before the final glasses are ordered.

It will be remembered that there is one form of ellipse which is practically free from aberration, and it would be interesting to know how far the cornea of the emmetropic eye deviates from this form. The investigation of this question would lead into mathematical computations far beyond my skill. So I laid the subject before my friend, Dr. Wm.

¹ Except in the *partial* form spoken of by Dobrowolski and Javal; but of this we will speak at another time.

Harkness, Professor of Mathematics, U. S. N., to whose profound knowledge of optics I am already so much indebted. The results of his calculations are herewith subjoined.

ON THE MONOCHROMATIC ABERRATION OF THE HUMAN EYE IN APHAKIA.

A Letter to Dr. Swan M. Burnett by Wm. Harkness.

Some months ago you pointed out to me the want of exact knowledge among oculists respecting certain optical properties of the cornea of the human eye, and at your request I willingly undertook to investigate them. For that purpose you placed in my hands two works whose titles are as follow :

1. Vorlesungen über die optischen Fehler des Auges. Von Prof. Dr. Ludwig Mauthner, in Innsbruck. Wien, 1876.
2. On the Anomalies of Accommodation and Refraction of the Eye. By F. C. Donders, M.D., Sydenham Society, London, 1864.

For the sake of brevity these works will be designated respectively as Mauthner and Donders.

The cornea of the emmetropic eye seems to have an ellipsoidal form, but the existing data for determining its curvature in the vertical meridian are too meagre to give a satisfactory result. I have therefore confined my attention to the horizontal meridian, and have taken the data for it from table VII, upon pages 598-599 of Mauthner. That table exhibits the form and dimensions of the cornea in seventeen pairs of emmetropic eyes, and from the mean of these thirty-four eyes, it appears that in the visual axis the radius of curvature is 7.708 millimetres, while 20° to the inner side of that axis it is 8.378 millimetres, and 20° to the outer side 7.884 millimetres. Mauthner does not explain the phrase " 20° to the inner (or outer) side of the visual axis," and I have had some trouble in ascertaining its true meaning.

It is customary to regard the outline of the cornea, along a horizontal section through the visual axis, as part of an ellipse. Let it be part of the ellipse NAMB, figure 6, of

$$\tan 2\alpha = \tan \varphi \frac{(rr_2)^{\frac{1}{2}} - (rr_1)^{\frac{1}{2}}}{(rr_1)^{\frac{1}{2}} + (rr_2)^{\frac{1}{2}} - 2(r_1r_2)^{\frac{1}{2}}} \quad (1)$$

$$\varepsilon^2 = \frac{r_1^{\frac{1}{2}} - r^{\frac{1}{2}}}{r_1^{\frac{1}{2}} \sin^2(\alpha + \varphi) - r^{\frac{1}{2}} \sin^2 \alpha} \quad (2)$$

$$a = \frac{r(1 - \varepsilon^2 \sin^2 \alpha)^{\frac{1}{2}}}{1 - \varepsilon^2} \quad (3)$$

$$b = a(1 - \varepsilon^2)^{1/2} \quad (4)$$

Substituting in these formulæ the radii of curvature given above, namely, $r = 7.708$ millimetres, $r_1 = 8.378$ millimetres, $r_2 = 7.884$ millimetres, we find for the normal cornea

$$\begin{array}{ll} \alpha = 5^{\circ} 49' 52'' & a = 10.9625 \text{ millimetres.} \\ \varepsilon^2 = 0.300135 & b = 9.1711 \quad " \end{array}$$

We have next to consider how a system of parallel rays falling upon such a cornea, parallel to the visual axis, will be refracted; and as our object is to determine the errors of refraction produced by the cornea alone, we must conceive the lens to be absent. On account of the thinness of

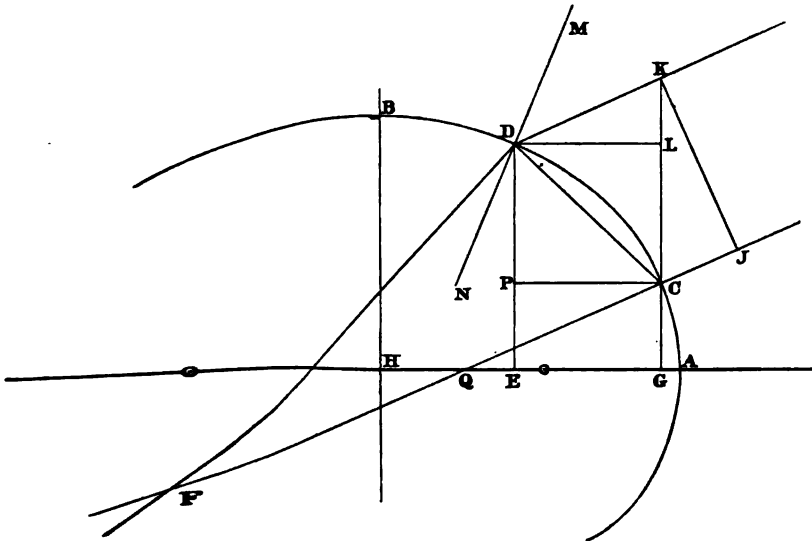


FIG. 7.

the cornea, the almost perfect parallelism of its surfaces, and the exceedingly slight difference in refractive power between it and the aqueous and vitreous humors, no sensible error will result if we regard the whole eye as a homogeneous solid, having the refractive index of the aqueous humor, and the same bounding surface as the cornea.

In fig. 7, let ACDB be one quarter of an ellipse, a portion of which forms the bounding surface of the cornea; AH being its semi-major, and BH its semi-minor, axis. Also let JCF be the visual axis, and KD a ray parallel to it, entering the cornea at the point D. The co-ordinates of the point C, at which the visual axis pierces the cornea, are HG and GC; and the co-ordinates of the point D are HE and ED. To find expressions for these co-ordinates, we assume the equation of an ellipse referred to its centre and axes, which is

$$0 = a^2 y^2 + b^2 x^2 - a^2 b^2 \quad (5)$$

and in this we put

$$x = a \cos \psi \quad (6)$$

$$y = b \sin \psi \quad (7)$$

Differentiating (5), and substituting the values of x and y from (6) and (7)

$$\frac{dy}{dx} = -\frac{b}{a} \cot \psi \quad (8)$$

As CF is normal to the ellipse, it is evident that at the point C

$$\frac{dy}{dx} = \tan (90^\circ - \alpha) = \cot \alpha. \quad (9)$$

Equating the right-hand members of (8) and (9)

$$\cot \psi = a \cot \alpha \div b \quad (10)$$

This gives ψ for the point C, and the corresponding values of x and y , which will be designated x_0 and y_0 , are found from (6) and (7). Let D, fig. 7, be any other point in the curve. To find its co-ordinates, produce GC to K, draw DL parallel to AH, and let KJ = d . Then

$$ED = GC + CK - KL. \quad (11)$$

But $ED = y$, $GC = y_0$, $CK = d \sec \alpha$, $-KL = (x - x_0) \sin \alpha$, and therefore

$$y = y_0 + d \sec \alpha + (x - x_0) \sin \alpha \quad (12)$$

When y is known (7), gives

$$\sin \psi = y \div b \quad (13)$$

and then x follows from (6). As y can not be accurately found until x is known, we begin by assuming

$$y = y_0 + d \sec \alpha \quad (14)$$

and having computed the corresponding value of x , a corrected value of y is obtained from (12). This, in its turn, gives a corrected value of x ; and by two or three successive approximations, both y and x become known with the utmost exactness.

Putting $MDL = \beta$, it is evident that because MN is a normal to the ellipse

$$\frac{dy}{dx} = \cot \beta \quad (15)$$

and then, by (8)

$$\cot \beta = -b \cot \psi \div a \quad (16)$$

in which β must be regarded as having the same sign as the y , from which it is derived through (13).

The angle of incidence of the ray KD upon the cornea is MDK , which is equal to $MDL - KDL$. But $KDL = CQA = \alpha$, and putting $MDK = \iota$, we have

$$\iota = \beta - \alpha \quad (17)$$

After refraction at the cornea, let the path of the ray KD be DF . Then FDN is the angle of refraction, which we will designate as ι' , and if μ is the refractive index of the eye then, by a well-known optical law,

$$\sin \iota' = \sin \iota \div \mu \quad (18)$$

Designating the angle CDE by γ , and the distance CD by D , we have

$$\tan \gamma = \frac{x - x_0}{y - y_0} \quad (19)$$

$$D = \frac{y - y_0}{\cos \gamma} \quad (20)$$

From the figure

$$\angle CDF = CDE + EDN + NDF \quad (21)$$

But $CDE = -\gamma$, $EDN = 90^\circ \sim \beta$, $NDF = i'$, and therefore

$$\angle CDF = (90^\circ \sim \beta) + i' - \gamma \quad (22)$$

The expression $(90^\circ \sim \beta)$ is used to indicate the excess of 90° over the numerical value of β ; the latter quantity being taken without regard to sign. For that portion of the cornea which lies between A and C, the complement of the angle CDF must be employed instead of the angle itself.

Again, from the figure

$$\angle CFD = MDK - FDN = i - i' \quad (23)$$

Finally, if F is the point where the ray KD intersects the visual axis, then CF will be the focal distance of the cornea for parallel rays. Representing this distance by F , we have from the triangle CDF

$$F = \frac{y - y_0}{\cos \gamma} \times \frac{\sin [(90^\circ \sim \beta) + i' - \gamma]}{\sin [i - i']} \quad (24)$$

It yet remains to translate these algebraic formulæ into numbers. We have already obtained the values of a , b , and α for a normal eye, and by substituting them in (10), (7), and (6), we find, for the point where the visual axis enters the cornea,

$$y_0 = 0.78071^{\text{mm}} \quad x_0 = 10.9227^{\text{mm}}$$

The monochromatic aberration of the cornea is most

conveniently investigated by tracing the paths which a considerable number of parallel rays impinging upon it will pursue within the eye. Eleven such rays have been considered, all situated in the same horizontal plane, at intervals of half a millimetre from each other, and the central one coinciding with the visual axis. For their passage a pupil five millimetres in diameter is necessary. The eleven rays in question furnish eleven values of d , varying by intervals of half a millimetre from $+2.5^{\text{mm.}}$ to $-2.5^{\text{mm.}}$, from which, by means of formulæ (12), (13), (6), (16), (17), (18), (19), and (24), the corresponding values of F have been computed. With respect to (18), it should be remarked that for reasons already stated, the cornea, the aqueous humor, and the vitreous humor have been regarded as a homogeneous mass for which $\mu = 1.3366$. This is Sir David Brewster's value for the aqueous humor. The value of F for the ray situated in the visual axis has been obtained from the well-known expression.

$$F = \frac{\mu r}{\mu - 1} \quad (25)$$

TABLE I.

KJ.	DE.	HE.	∠MDL.	∠MDK.	∠NDF.
mm.	mm.	mm.			
+2.5	+3.2265	10.2617	+24° 11' 32"	+18° 21' 40"	+13° 37' 54"
2.0	2.7441	.4603	20 32 51	14 42 59	10 57 23
1.5	2.2583	.6250	16 53 36	11 03 44	8 15 13
1.0	1.7691	.7566	13 13 28	7 23 36	5 31 26
+0.5	1.2765	.8558	9 32 14	+3 42 22	+2 46 19
0.0	0.7807	.9227	5 49 52	0 00 00	0 00 00
-0.5	+.2817	.9574	+2 06 14	-3 43 38	-2 47 16
1.0	.2228	.9593	-1 38 56	7 28 48	5 35 21
1.5	0.7266	.9280	5 25 37	11 15 29	8 23 56
2.0	1.2359	.8625	9 14 01	15 03 53	11 12 46
-2.5	-1.7487	10.7614	-13 04 17	-18 54 09	-14 01 37

KJ.	∠EDC.	Log. CD.	∠CDF.	∠CFD.	CF.	CF.
mm.					mm.	mm.
+2.5	-15° 07' 24"	0.40173	+94° 33' 46"	4° 43' 46"	30.630	30.632
2.0	13 15 08	.30473	93 39 40	3 45 36	.697	.697
1.5	11 23 28	.17820	92 45 05	2 48 31	.727	.728
1.0	9 32 22	0.00098	91 50 23	1 52 07	.721	.723
+0.5	-7 41 05	9.69923	+90 55 10	0 56 03	.682	.682
0.0	.....	.....	.....	0 00 00	.608	.610
-0.5	-3 58 41	9.69915	-90 54 49	0 56 22	.504	.502
1.0	2 05 35	0.00094	91 50 50	1 53 27	.357	.359
1.5	-0 12 05	.17820	92 46 14	2 51 33	30.183	30.182
2.0	+1 42 36	.30481	93 41 21	3 51 07	29.970	29.971
-2.5	+3 38 56	0.40390	-94 36 16	4 52 32	29.725	29.724

Table I gives for each value of d , the resulting value of F , together with the most important quantities occurring in its computation.

The quantities contained in the various columns are indicated by the letters at their heads, which refer to figure 7. For example, the heading of the first column is KJ, which indicates that the quantities contained in it are the lengths of the line KJ, figure 7. For convenience of reference, the symbols by which these quantities are designated in the formulæ are here recapitulated:

KJ = d	Angle MDL = β
DE = y	" MDK = i
HE = x	" NDF = i'
CD = $(y - y_0) \div \cos \gamma$	" EDC = γ
CF = F	" CDF = $(90 \sim \beta) + i' - \gamma$
	" CFD = $i - i'$

The results contained in the first of the two columns headed CF are exhibited graphically in figure 8, the values of F being taken as abscisses, and the corresponding values of d as ordinates, and it is evident that the focal curve is a

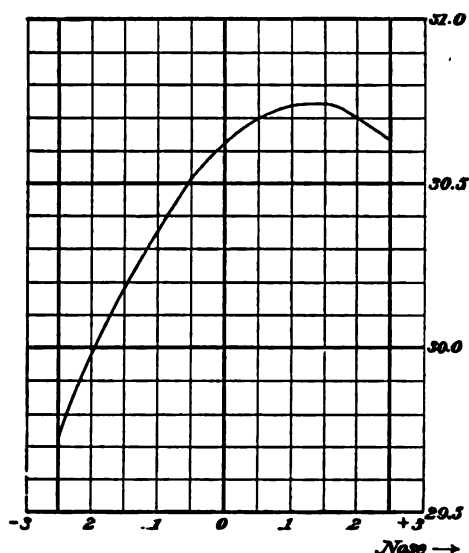


FIG. 8.

parabola. To find an expression for it, we put

$$F = C - m(d - n)^2 \quad (26)$$

developing and rearranging the terms

$$F = (C - mn^2) - md^2 + (2mn)d \quad (27)$$

When d vanishes (27), reduces to

$$F = (C - mn^2) \quad (28)$$

and by comparing this with the numbers in the first of the two columns headed CF we see that

$$C - mn^2 = 30.608^{\text{mm.}}$$

Substituting this in (27), and comparing the resulting equation with the values of F for $d = +2.5^{\text{mm.}}$ and $d = -2.5^{\text{mm.}}$, we obtain

$$\begin{aligned} 0 &= -0.022 - 6.25m + 5mn \\ 0 &= +0.883 - 6.25m - 5mn \end{aligned}$$

whence

$$\begin{aligned} m &= +0.0689 & 2mn &= +0.181 \\ n &= +1.314 & mn^2 &= +0.119 \\ & & C &= +30.727 \end{aligned}$$

Substituting these values in (26) and (27), we have for a first approximation

$$\begin{aligned} F &= 30.727 - 0.0689(d - 1.314)^2 \\ &= 30.608 - 0.0689d^2 + 0.181d \end{aligned}$$

A comparison of the values given by these expressions with those contained in the table, shows that it will be more accurate to take

$$C - mn^2 = 30.610^{\text{mm.}}$$

Doing so, and combining this with the values of F corresponding to $d = +2.0^{\text{mm.}}$, and $d = -2.0^{\text{mm.}}$, we have finally

$$\begin{aligned} F &= 30.730 - 0.0691(d - 1.314)^2 \\ &= 30.610 - 0.0691d^2 + 0.1817d \end{aligned}$$

The values of F computed from these expressions are exhibited in the last column of table I, and the accuracy with which they represent the numbers in the preceding column is apparent.

Table II shows how the monochromatic aberration actually existing in the normal cornea compares with what would have existed if the cornea had been spherical. Upon each line of the table, the first column contains the assumed diameter of the pupil; the second, third and fourth columns relate to the normal cornea, and contain respectively the greatest and least focal distance occurring within the area of the pupil, and the amount of astigmatism corresponding to them; the fifth, sixth, and seventh columns relate to a spherical cornea, and contain similar data for it. In computing the focal distance at various points of a spherical cornea it has been assumed that $r = 7.708^{\text{mm}}$, $\mu = 1.3366$, and the following formulæ have been employed:

$$\sin i = d \div r \quad (29)$$

$$\sin i' = \sin i \div \mu \quad (30)$$

$$F = \frac{2 r \sin \frac{1}{2} i \cos \frac{1}{2} i}{\sin (i - i')} \quad (31)$$

As the monochromatic aberration we are considering occurs in a single meridian, its correction by cylindrical lenses is impracticable, but nevertheless its amount may be expressed in the notation usually employed for astigmatism. The requisite formula is

$$\text{Astigmatism} = 0.0396 (F - F') \quad (32)$$

In which F and F' are the lengths in millimetres of the greatest and least focal distances found within the area of the pupil, and the result is expressed in terms of the Paris inch.

TABLE II.

d .	NORMAL CORNEA.			SPHERICAL CORNEA.		
	F .	F' .	As.	F .	F' .	As.
mm.	mm.	mm.	Par. in.	mm.	mm.	Par. in.
1	30.684	30.502	1:139	30.608	30.556	1:476
2	.723	.359	1: 69	.608	.414	1:130
3	.728	30.182	1: 46	.608	30.171	1: 58
4	.728	29.971	1: 33	.608	29.826	1: 32
5	30.728	29.724	1: 25	30.608	29.376	1: 21

In conclusion, the results at which we have arrived may be summed up as follows :

1. The monochromatic aberration originated by the normal cornea occurs principally on the outer side of the visual axis—that is, on the side farthest from the nose.

2. The diameter of the pupil is usually about four millimetres. For diameters less than this, the monochromatic aberration of a spherical cornea would be less than that of the normal cornea. For greater diameters, the reverse is true. This is contrary to the generally received opinion. (See Donders, foot-note on page 310.)

3. Donders says (pp. 456, 457), the astigmatism in sharp eyes is not generally more than from 1:140 to 1:60, and whenever it exceeds the latter amount, the power of vision suffers under some circumstances. An astigmatism of 1:40 he regards as decidedly abnormal. Nevertheless, with a pupil four millimetres in diameter, the normal cornea produces monochromatic aberration to the extent of 1:33 ; and as there is no confusion of images in the normal eye, it seems probable that the crystalline lens exerts some compensating action. This suspicion is strengthened by the well-known fact that in aphakia, the acuteness of vision is nearly always improved by giving a certain inclination to the powerful convex glasses which are then necessary. It therefore becomes important to ascertain the true structure and position of the lens. What is the distribution of density in its layers? Are its two halves, situated respectively on the inner and outer sides of the visual axis, of unequal refractive power? Is its form unsymmetrical, or is it unsymmetrically placed with respect to the visual axis? Or is it inclined to that axis? These are difficult questions, but doubtless they can be answered by patient observation.¹

Washington, Feb., 1883.

(¹ Prof. Ludwig Matthiessen, of Rostock, has made some extensive investigations on the optical character and properties of the crystalline lens. Compare his exhaustive paper, "Die Differenzialgleichungen der Dioptrik der geschichteten Krystalllinse," in E. Pflüger's *Archiv f. Physiologie*, Bd. xix, pp. 480-562 ; also a paper by M. Peschel, "Experimentelle Untersuchungen über die Periscopie der Krystalllinse," *ib.*, Bd. xx, pp. 338-353.) S. M. B.

AN HISTORICAL NOTE ON CORNEAL ASTIGMATISM.

Senf was the first (in 1846) to make measurements of the cornea, which showed it to be ellipsoidal rather than spherical in shape. Helmholtz arrived at the same conclusion from his ophthalmometrical measurements which were published in *Gräfe's Archives* B. i, Abt. 2 (1855). In this article (p. 18), he says: "The form of the cornea corresponds approximately to an ellipsoid formed by the revolution of an ellipse about its major axis."

He gives these measurements as well as those of Senf in the first part of his "Physiologische Optik" (pages 8 and 11 of the French edition), published in 1856; but it is evident that he still considered the cornea to be an ellipsoid of revolution, as his measurements were confined to one meridian (the horizontal). He speaks at this time (p. 142) of the astigmatism of Young as being caused by the lens, and of the correction of his own astigmatism (of low degree) by means of an obliquely placed concave lens, but no hint is given that the cause of the astigmatism was in the cornea.

It was Knapp who first determined by ophthalmometric means that the cornea was not an ellipsoid of revolution but an ellipsoid with three unequal axes.

In the "Verhandlungen der vom 3-6 Sept., 1859, im Heidelberg versammelten Augen Artze," Berlin, Peters, 1860, we find (p. 19), that "Dr. Knapp gave an account of his measurements on the curved surface of the human eye, made by means of Helmholtz's ophthalmometer. 1. The cornea. Helmholtz's measurements were confined to the horizontal meridian. Knapp, on the other hand, had measured four eyes in many different meridians with the following result: 1. The centre and apex of the cornea do not coincide. . . . The anterior focal distance of the horizontal ellipse = 23.095 mm.; of the vertical meridian = 23.34 mm. The posterior focal distance of the horizontal ellipse = 30.18 mm.; of the vertical ellipse = 31.1 mm. . . . In the discussion on this division of the subject, Knapp remarked that in all probability it was the difference between the vertical and horizontal ellipses which rendered cylindrical glasses necessary,

and was the cause of the difference in the 'accommodation-line' in the vertical and horizontal directions. After cataract-extraction, in sclerectasia and hyperpresbyopia, such glasses were of benefit, as had been shown by Prof. Donders.

"In regard to the accommodation-line, Prof. Donders remarked, that in his opinion, it was due to the lens, from the fact that it was in intimate connection with polyopia, which was undoubtedly caused by the lens as proven by entopic experiments."

These investigations were published in detail by Knapp in his inaugural thesis, "Die Krümmung der Hornhaut des menschlichen Auges" in 1860.

Donders in his first papers on the refraction and accommodation of the eye, published in *Gräfe's Archives* makes in B. vii (1860), Abt. 1, p. 176, an application of this asymmetry to the explanation of abnormal astigmatism, in contradistinction to the lenticular theory of Young, and gives reference to Knapp's paper. So far as I know this is the first mention made by Donders of corneal astigmatism. In *Gräfe's Archives* B. viii (1862), Abt. 2, appeared Knapp's classical paper "Ueber die Assymmetrie des Auges in seinen verschiedenen Meridianebenen." While this paper was in press, Donders published his "Astigmatisme en cylindrische Glazen," which, for the first time, brought the subject of astigmatism and its correction prominently before the profession. Soon afterward (1864), his treatise on the "Anomalies of the Refraction and Accommodation of the Eye," appeared, which made astigmatism a part of the general knowledge of the profession.

The opinion that regular astigmatism resides in the cornea has been most thoroughly substantiated by all observations made since that time. Javal in the *Annales d'oculistique*, t. 87 (1882), pp. 33-43, says that in the testing and measurement of more than 100 eyes, the total astigmatism corresponded exactly with the corneal astigmatism, with the exception of four cases, and in one of these the difference was only 0.2 D; and still further examinations by him, and by Dr. Nordenson, amounting to more than 250 additional cases, have only confirmed his first observations.

A CASE OF RETINITIS ALBESCENS PUNCTATA.

(*Mooren, Kuhnt.*)

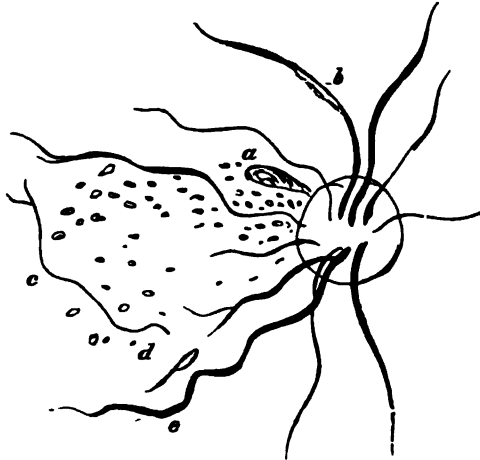
By SWAN M. BURNETT, M.D., WASHINGTON.

Mrs. L. A. B., aged fifty-eight, has of late years enjoyed very good health. Formerly, and particularly at the climacteric period, she had serious attacks of epistaxis, but these are now much less frequent and severe.

In June last she suddenly noted a dark spot in the centre of the visual field of the right eye. The scotoma, when projected to the opposite side of the street, was about one yard square, and made it impossible for her to distinguish even large objects at that distance. Her vision remained in this state for more than a month, when the scotoma began to break up, and when I saw her for the first time in December, 1882, there was barely a trace of it, and vision in that eye was the same as that in the other, namely, = $\frac{1}{2}$. On examination, the visual field was found to be intact and color-perception normal, as in the fellow-eye.

An ophthalmoscopic examination showed the media to be perfectly clear, but revealed some peculiar changes in the fundus, which are indicated in the accompanying diagram. In the region of the macula lutea, and occupying the space between this and the optic disk, as well as somewhat below the latter, there were a large number of very small yellowish-white dots, which could easily be overlooked in the indirect method of examination. These dots were not always round in shape, but frequently oblong, and usually had a sharply-defined outline. They were not evenly distributed over the surface, nor were there any isolated areas in which they were thickly studded. No abnormal accumulation of pigment was anywhere visible. The retinal vessels going to the inner side were normal as to their size and course. The vessels going to the other side, however, showed

marked alterations. One of the large veins running downward (*e*) became very tortuous toward the end of its course, while a smaller one just above it became lost, and its place was occupied by a white band (*d*), similar in appearance to the dots, while another (*b*), running from the upper portion of the disk, became at a short distance from its edge a mere thread, to become again



of its normal size or even larger. One small twig (*c*), running quite close up to the macula, was very tortuous, and arose abruptly from the vicinity of the vessel which had been transformed into the white band, no direct connection being found between it and any of the vessels in the neighborhood. One small tortuous vessel ran from the edge of the disk directly across to the upper edge of the macula.

At the upper outer edge of the disk there was a hemorrhagic spot (*a*), extending about $\frac{1}{4}$ of a disk diameter into the retina. It was pear-shaped, and its head had a white centre. There were no other abnormal appearances of the fundus.

Ophthalmological literature contains but five cases which in their general features bear a resemblance to the foregoing. The first mention of such appearances is to be found in Mooren's recently-issued "*Fünf Lustren Ophthalmogischer Wirksamkeit*," 1882, p. 216, though the author makes note of the fact that Kuhnt had shown him a drawing of similar appearances before his own case was put on record. Kuhnt

has reported his case in full before the Fifty-fifth Congress der Natur-Forscher und Aertze, held in Eisenach—a very brief abstract of which is to be found in *The Ophthalmic Review*, vol. i, No. 14, p. 411.

Besides these two, Hirschberg has reported three others in his *Centralblatt f. Augenheilkunde*, Dec., 1882, p. 330.

Of these cases I subjoin an abstract, in order that we may be able to take a general view of the character of these peculiar alterations.

MOOREN'S CASE (1).—A man, aged thirty. $V = \frac{1}{16}$. VF normal. Media clear. Hundreds of punctiform pale-white dots, which resembled cholesterine crystals, or as if the retina and choroid had been punched through. The relatively narrow retinal vessels were nowhere covered by the specks, but the latter were pretty evenly distributed between the arterial twigs. Disk slightly gray, with all the appearances of a past inflammatory process. In six weeks $V = \frac{1}{4}$, with the condition of the retina remaining the same.

KUHNT'S CASE (2).—The patient was a girl with $V = \frac{1}{4}$, and contraction of VF. Minute white specks on the inner retinal layers, and seen only in the erect image. K. reports that he has seen two similar cases since the first one.

HIRSCHBERG'S CASE (3).—Woman, fifty-nine years of age. Three weeks before had suffered from hæmoptysis. Three days before he saw her she had sudden impairment of V in R eye, accompanied with photopsies. There was atheromatous degeneration of the arteries, and palpitation without any valvular trouble. Urine free. $V = \frac{1}{800}$; central scotoma, but VF not contracted. No alteration in disk; but between m.l. and o.d. numerous small, white specks, which had almost a crystalline appearance, and apparently lying on the retina. In nine months these changes had disappeared, and $V =$ that of the fellow-eye.

HIRSCHBERG'S CASE (4).—A woman, fifty-eight years of age, suffering from catarrh and dilatation of the stomach. Heart and vascular system normal. Urine free. Small scotoma of 3° in centre of L VF. $V = \frac{1}{16}$. Retinal hemorrhage above the disk three or four o.d.'s in size, which H. thinks due to vomiting. O.D. normal. V finally became $\frac{1}{16}$, and the changes in the retina retrogressed.

HIRSCHBERG'S CASE (5).—Woman, sixty-two years of age. An attack of cholera morbus. Suddenly a green scotoma in centre of

field of left eye. $V = \frac{1}{100}$. VF normal; o.d. and vessels also normal. Fine points in the centre of the retina. Urine free.

Six cases do not furnish sufficient data on which to base any reliable opinion as regards either the etiology or essential nature of the affection; but it seems to be evident that there is no derangement of the general system to which it can be referred. In every reported case it was unilateral, and the urine was found to be normal in every instance in which it was examined.

The peculiarities of the affection seem to be that the alterations are confined almost exclusively to the region between the m.l. and o.d., and are in the retina, and most probably confined to the inner layers.

Vascular disturbances are not always present, but in the case reported by me were quite marked; in fact, all the characteristics of a retinitis were more pronounced in this case than in any of the others. The central scotoma, which was noted in three cases, we can attribute to such an interference with the nutrition of the retina in the region of the m.l., as to hinder it in the proper performance of its function. It may occur at any age, and affects both sexes.

The prognosis is, as a rule, good—some cases going on to complete recovery, while none seem to lead to destruction of vision.

MELANOMA OF THE IRIS.

BY PROF. ERNST FUCHS, M.D., OF LÜTTICH.

Translated by ISIDOR FURST, New York.

(Fig. 1, plate vii.)

THE abnormal accumulations of pigment in the iris show themselves in two forms: either as dark, at times elevated-looking spots (*nævi pigmentosi*), or as circumscribed small tumors designated as *melanomata*. The latter sometimes reach relatively considerable dimensions. v. Gräfe¹ has described a case in a girl of fifteen, in whom a blackish-brown oval tumor, measuring one and one and a half lines in its diameters, grew from the pupillary margin of the iris and projected so far into the anterior chamber as to almost touch the posterior corneal wall. From this node a flat tumor seems to have extended along the posterior surface of the iris as far as its ciliary margin, where an oblong, dark stripe appeared. In a case clinically observed by Knapp,² likewise not examined anatomically, there were in the iris, in its larger circumference, six nodules, ranging in size from a pin's head to a diameter of five millimetres. The eye in question was otherwise quite normal, only from time to time (every three or four months) slight hemorrhages occurred into the anterior chamber. Inasmuch as Knapp was unable to perceive macroscopically any vessels in the tumors, it remains doubtful whether the hemorrhages originated from them or from dilated vessels of the iris.

In tumors having reached this degree of development,

¹ *Gräfe's Archiv*, Bd. vii, 2, p. 36.

² "Intraocular Tumors," German edition, p. 220; English edition, p. 290.

we must of course ask ourselves whether we have not to deal with a malignant new-formation, with a melano-sarcoma. These two kinds of tumor at times bear an extraordinary external resemblance to each other; and, moreover, in some cases melano-sarcomata have really been seen to develop from simple melanomata.¹ The differential diagnosis between these two kinds of tumor, in many cases, can only be made from the anamnesis, or, that failing, from prolonged observation of the patient, so as to determine whether the tumor remains stationary or is growing.

Our anatomical knowledge of melanomata of the iris is very meagre, because tumors which do not form the object of an operation only accidentally come under examination. Knapp has examined anatomically a melanoma of the iris and gives the following description of it: "The tumor consists of a circumscribed, exuberant development of the stroma cells of the iris, the minority of them colorless, the majority pigmented; they are arborescent and anastomosing. They possess no sharp demarcation toward the neighboring tissue, and the other parts of the iris are perfectly normal."

To the best of my knowledge, this is the only and withal very brief anatomical description of a melanoma of the iris. I therefore subjoin the result of the examination of a case observed by me, particularly because its histological composition differs considerably from that found by Knapp.

In December, 1880, a woman aged seventy-five presented herself at Prof. v. Arlt's ophthalmic clinic at Vienna, suffering from asthenopia. The affection was due to an incipient senile cataract. Besides, the following condition was demonstrated at the right eye, which was free from irritation. At the inner upper quadrant of the pupillary margin, a blackish-brown prominence was visible; it was four millimetres in length, and projected from the lower surface of the iris into the pupillary space. It projected above the pupillary margin about one millimetre during contraction, and

¹ Hirschberg: *Gräfe's Archiv*, Bd. xiv, 3, p. 285; Warren Tay: *Ophthalmic Hospital Reports*, v, p. 230; Schiess: *Virchow's Archiv*, lxix; and Hosch: *Centralbl. f. pract. Augenh.*, 1881, p. 361.

² *L. c.*

two millimetres during dilatation of the pupil. This prominence evidently was merely the free border, directed toward the pupil, of a larger tumor situated in the posterior chamber, for the iris was considerably crowded forward in the entire upper inner quadrant and even beyond it. The rest of the iris was normal; the pupil was round and dilated well under atropine, remaining round. The lens was in its normal position. Tn.

The patient not being very intelligent, knew nothing of her tumor. Inasmuch as the appearance of the tumor likewise furnished no diagnostic points, it was impossible to decide whether it was a melanoma or a melano-sarcoma. I thought, therefore, it would be the safest course to remove the tumor by an iridectomy. As the extraction of the cataract would subsequently have to be performed any way, the iridectomy could certainly do no harm, and at most be looked upon as a preliminary iridectomy. Inasmuch as a lancet could not have been brought forward far enough to secure a wound of sufficient width, owing to narrowness of the anterior chamber at the corresponding point, I made the incision with Gräfe's knife and excised the entire upper inner quadrant of the iris together with the tumor.

The examination of the excised portion showed the following (plate vii, fig. 1): The iris is very strongly pigmented, even where it is not occupied by the tumor. Not only the pigmented cells of the stroma contain an uncommon amount of pigment, but also the free pigment granules which are present in every iris are accumulated in unusual numbers. This is the case particularly in the anterior and posterior limiting layers, which consequently appear very dark in color. The strictly pathological proliferation of the pigment cells starts at a point corresponding in its position to the peripheral end of the transverse section of the sphincter (at *c*). At this point we find even in normal irides almost constantly an accumulation of roundish, tense, non-branching cells, which appear striking on account of their especially ample contents of (sometimes very coarse) pigment granules. The proliferation seems to have sprung from these cells; from there it extends in three directions toward the pupillary margin (*a*), toward the ciliary margin, and backward toward the uveal layer of the iris and the tumor (*b*).

The proliferation directed toward the pupillary margin forms a black wedge, which almost reaches the free border of the iris and lies rather nearer the posterior than the anterior surface of the iris. It seems to me to include the sphincter, of which no trace is seen elsewhere. To be sure, as a rule, the transverse section of the sphincter lies still nearer the posterior surface of the iris, but there are considerable variations in this respect; on looking through my preparations I found one in which the position of the transverse section of the sphincter exactly corresponds to that of the black wedge. This proliferation is quite black in its centre, so that no details can be distinguished; at the margin it separates into single black cells. The latter are roundish, without any processes, and very strongly pigmented, so that their nuclei are invisible; they are exactly like the cells which I have mentioned above as being found physiologically in the circumference of the sphincter.

A similar wedge of pigment extends into the iris in a centrifugal direction; passing at the same time obliquely forward, it reaches at one point the anterior surface of the iris. The main proliferation, however, has extended backward. A broad black band here perforates the posterior limiting layer and the uveal leaf of the iris, so as to spread behind it and form the tumor observed in our patient (*b*). That formation crumbled during the operation, only fragments of it, adhering to its thick black root, remaining in the specimen. Therefore in the illustration, I could draw the outline of the tumor only approximately. The tumor consists of an accumulation of cells which are so deeply pigmented that altogether they form a uniform black mass. Consequently, only at points where the tumor was lacerated it is possible to recognize its composition of massive cells, in which, owing to the abundance of pigment, no nucleus is visible. The tumor seems to possess neither blood-vessels nor even a stroma, otherwise traces of it would be apparent at the lacerated edges. At the central side, the posterior limiting membrane of the iris is partly reflected on to the surface of the tumor (at *d*). Nothing can be seen anywhere of the uveal pigment of the iris; probably it has been

brushed off during the operation. To me it appears certain that it has in no way participated in the development of the tumor.

This tumor is to be included among the simple melanomata, for it consists solely and exclusively of cells which are completely analogous to the pigment cells occurring physiologically in the iris. Sarcomata differ from it in the following particulars: Even in the most intensely pigmented sarcomata we always find some slightly or not at all pigmented cells in which the large nuclei and especially the large nuclear corpuscles characteristic of sarcoma-cells can be recognized. The fundamental tissue in the surroundings of the sarcoma shows proliferation of nearly all elements of the stroma and very frequently, too, deposition of round cells ("formative cells"). The sarcoma has a distinct stroma with blood-vessels. The only thing common to sarcomata of the uveal tract and the tumor under consideration is this, that both originate from the stroma cells of the iris and that the pigment epithelium plays a passive part herein.

Of course pigment tumors occur in the iris which do not spring from the stroma of that structure, but owe their origin to an hypertrophy of the uveal layer. Not rarely they are seen as a row of small hemispherical projections at the pupillary margin of the iris; I have seen a case in which a whole connected series of them had detached itself from the pupillary margin and floated in the aqueous humor in the shape of a black rosary-like formation. Also larger masses of pigment, probably of the same origin, floating free in the anterior chamber, have been repeatedly described. Perhaps the case of v. Gräfe quoted above belongs among them; for v. Gräfe expressly states that the tumor seemed to spring from the "pigment border of the pupil." Such iridal tumors, to the best of my knowledge, have not yet been examined anatomically. They would find their analogue in a case of melanoma of the choroid described by Knies.¹ The melanoma formed a node, two millimetres long and one millimetre broad, immediately behind the

¹ *Arch. of Ophthalm. and Otol.*, vol. vi, pp. 395, 396.

ciliary processes. "It lies between lamina elastica choroideæ and pars ciliaris retinae. Externally it is covered with perfectly normal choroid, and consists exclusively of large, very strongly pigmented, roundish masses of protoplasm, without a trace of sarcomatous elements."

Explanation of Fig. I, Plate vii.

Magnified 42 diameters.

a, Pupillary margin of the iris ;

b, Melanoma ;

c, Region of the posterior end of the transverse section of the sphincter.

d, Posterior limiting layer of the iris reflected on to the tumor.

ARTERIO-VENOUS ANEURISM IN THE RETINA.

BY PROF. ERNST FUCHS, OF LÜTTICH.

(*Plate vii, fig. 2.*)

Translated by WILLIAM C. AYRES, M.D., N. Y.

A Bohemian, twenty-six years old, was struck on the right eye by a limb of a tree, in Oct., 1880. At the time there was only a small wound in the inner corner of the eye to be seen, and the eye was bloodshot for several weeks. Vision was not perceptibly diminished at first; after six months he noticed that he commenced to see badly, and he often had a sensation of pressure in the eye. He consulted a doctor, who determined $V = \frac{2}{3}$. In 1881, he came to Prof. von Arlt's clinic. At that time he could only count fingers at $\frac{3}{4}$ metres with eccentric fixation. The right eye looked normal; only a small cicatrix could be found with difficulty in the region of the caruncle; refracting media clear; refraction E. The papilla was not sharply defined, but otherwise normal; also the whole upper half of the retina except a few moderately conspicuous striations. Below, there were two large vessels, which were very conspicuous on account of their size and course (fig. 2). The vein passed almost perpendicular downward: the artery, which was to the outer side of the vein, on the papilla, passed over the vein at the inferior border of the papilla, and then ran downward and inward. In the first half of its course there were only isolated dilatations; between these it was narrower than normal,—in fact, in one place (where it ran downward) this was so much the case that the vessel could hardly be seen. The inferior half was distinguished from the superior in that it widened suddenly (cæcum-like). From this place the artery was as thick as the vein, and also as irregular in its course.

Both artery and vein disappeared in a large, somewhat ill-defined disc. The disc was prominent, covered with blood-spots, and so dark that no further details could be made out. Both the artery and vein were of the same dark color, and could only be distinguished from one another by their branches. The artery had three branches, which were normal in all respects. The vein had only two, the upper one of which was normal; the under greatly varicose, like a rosary, but not particularly irregular in its course. A branch given off from this was of normal calibre. Where the arteries crossed the veins they were in front of them.

There was no spontaneous pulsation; a slight pressure made the large vein and a large branch of the artery pulsate, the latter in the usual way. In the round tumor pulsation could not be produced.

Besides the above, the following changes were to be seen. In the region of the macula lutea, there was a white star-shaped figure, similar to that of Bright's retinitis. In the direction of the continuations of the rays of the star were also white spots. Four similar spots were found in a group below the papilla. On the inner side of the retina, there was a band-like figure, which grew narrower as it passed away from the papilla, and, at the same time, bent downward. I have never seen any thing like it in the background of the eye. It had a silvery reflex; its color could only be compared to that of those figures which we sometimes find in the region of the macula, in *neuritis e tumore cerebri*. They were accumulated in groups, which made the band resemble a cirro-cumulus cloud in the sky, differing in this particular, and also by their silvery reflex, from the figures which we meet with in Bright's disease. The band had the same silvery spots as at the macula. In the former there were many small curly black lines, looking like small worms. On closer examination we could see, however, that they were only the spaces through which the red choroid could be seen, but the latter appeared black from contrast. It could also be seen that the band was made up of small circular spots, which did not touch each other over the whole surface, allowing the above spaces to appear between them. Toward its peripheric end, the band was discontinuous in places. Several veins were seen to pass over the band. Since the patient was told that we could not promise to cure him, he went home. He afterward wrote that up to the end of Feb., 1882, his eye had not changed. He could see large objects with it, but that the middle seemed to be covered by a spider-web.

If we try to find out the significance of the various conditions we must explain the following points:

1. The round spot in which both the vessels ended seemed to me to be a spurious aneurism. I think that the trauma must have caused a rupture of both vessels, and a consequent pouring of their blood either into or under the retina. The latter seems the more probable, since the spot was too large to be in the retina itself. Also, in order to explain why the blood did not go farther into the tissues, we must consider that after a time the retina and choroid became attached to one another. There is nothing improbable in this, for the aneurism was gradually reduced to its present size.

2. Why are both artery and vein dilated? *A priori* one could conclude that the aneurism either helped or hindered the blood circulation. The first would be the case when the blood was saved the trouble of passing through intermediate capillaries, and emptied direct from the artery into the vein. The walls of the latter would give way to the increased blood-pressure, and the vessel become larger and tortuous. But then we could not understand why the artery was dilated. If the aneurism retarded the circulation we could explain the size of the artery, but not that of the vein. The diminished *vis a tergo* could not be the cause, or we would also expect to find large veins in embolism of the central artery. Perhaps we may consider it in this way: at the time just after the injury the aneurism was small; the blood went directly from the artery into the vein, and the latter became ectatic. Later the sac became larger, and there was an impediment because the blood could not find its way easily. In this condition, the artery would become ectatic and the vein would remain as it was. We might also consider that the larger artery could have compressed the vein where it crossed it near the papilla. If this were the case the branches of the vein should be equally dilated. However we consider it, we are certain that in all cases of aneurysma arterio-venosum, we almost always find the artery and the vein enlarged. The same was the case in Magnus' retinal aneurism. I am not able to

explain why the artery is dilated so irregularly, and why it almost disappears in places, and again why one branch of the vein should be dilated and the other not.

3. The changes in the macula, and to the inner side of the retina are perhaps microscopically the same as those we find in Bright's disease. They appear to be of more recent date than the trauma, and their advent was perhaps simultaneous with the diminution of vision. It is certain that they are not degenerated blood extravasations, or atrophic patches in the choroid, or heaps of cholesterin crystals: I consider them as something very different. From their analogy with the white spots of retinitis from cerebral tumors, I am inclined to look upon them as having been caused by the change in circulation, notwithstanding the fact that they were situated just at the place where the circulation has but little sway.

There is up to this time only one case of arterio-venous aneurism on record, that of Magnus.¹ This was also the result of a trauma. It differs from ours in the fact that the artery passed directly into the vein, there being no intermediate sac. Surgeon makes a sharp distinction between these two conditions. O. Weber² writes as follows: *Aneurysma varicosum* we call those forms in which the artery and vein are both ruptured, so that the blood not only passes from the artery into the vein but also into the connective tissue between them, and by a capsulation of this blood an aneurism is produced; by both vessels remaining open the blood from the artery goes into the vein.

A *varix aneurysmaticus* is produced, when "only a simple communication between both vessels occurs. There is no sac and no aneurism; but the vein becomes varicose under the increase of pressure." My case corresponds to the *aneurysma varicosum*; the *varix aneurysmaticus*, to that of Magnus. Magnus also says, that there was no difference in the color of the artery and vein, so that only by watching the smaller branches could it be said which was which. Magnus' explanation, that the arterial and venous blood became

¹ *Virchow's Archiv*, vol. lx, p. 38, 1874.

² "Handbuch der Chirurgie," by Pitha and Billroth, vol. ii, 2, p. 149.

mixed, was refuted by Leber,¹ by his saying that blood from a vein can never enter an artery. The fact of the same color in both artery and vein was also shown in my case. O. Weber further says of such aneurisms in general, that the artery sometimes looks like a vein on account of the condition of its walls. It is to be imagined both in Magnus' and our case that the enormous size and extensive filling of the vessels produce the same color in both, especially as the neighboring vessels which were not dilated were of a normal appearance.

¹ *Grafe-Sämisch*, vol. v, p. 528.

CONGENITAL ANOMALY IN THE CHOROID.

BY PROF. E. FUCHS, IN LIEGE, BELGIUM.

Translated by SWAN M. BURNETT.

(*With plate i.*)

Viertel Salomon, fifty-two years of age, from Galizien, presented himself at the clinic of Prof. Arlt on the 13th of January, 1880, on account of a dimness of vision in the right eye, which he had observed for the first time about a year previously.

In this eye there were found some peripheral opacity in the lens, a slight atrophic condition of the papilla, and some small atrophic spots at the periphery of the choroid. Fingers were counted at $\frac{1}{2}$ of a metre; the V F was moderately contracted—concentrically,—but there was no scotoma. The dimness of vision seemed to depend upon the atrophy of the optic nerve, for which no satisfactory cause could be found. An inunction treatment, continued for four weeks, and followed by the internal administration of iodide of potassium, was not attended by any material improvement in vision.

The *left* eye, which externally appeared normal and had $V = \frac{1}{2}$, showed an incipient decoloration of the disk. Aside from this there were the following independent appearances at the fundus. Upward and outward from the macula there was a large, irregularly-round figure, having a diameter four or five times as great as that of the optic disk. It was yellowish-white in tone, with a black background. The background was manifest on the surface of the figure only as more or less widely-separated black spots, but at the periphery it became even and pronounced. At the edge the bright figure terminated in numerous tongue- and knob-like processes, between and beyond which the black background came

out clear and distinct, forming a coal-black edge to it. This part showed a striking resemblance to the *arbor vitæ* figure in sections of the cerebellum. Here and there, in the black edge, were to be seen small white islands of a narrow spiral shape.

Two retinal vessels passed across the figure: one, an artery, over the upper part; and one, a vein, across the lowest projecting point. Aside from these, the whole extent of surface was checkered with a net-work of vessels, very similar in appearance to those of the choroid.

They ran in every direction, but all had a course toward the peripheral processes, and terminated at their apices, though occasionally some vessels crossed the projection and the intermediate dark patches transversely or obliquely.

If I had doubts as to these vessels being those of the choroid, it is because they differ in many essential particulars from the normal choroidal vessels. They are narrow, with mostly dichotomous branches, resembling thus more nearly the vessels of the retina, with this difference, that their color was somewhat brighter, and they were all alike, there being no distinction between arteries and veins. No connection could be established between these vessels and the two retinal vessels which transversed the figure. Nor could they be traced to any true choroidal vessels, but were sharply cut off at the edge of the figure, and besides, no choroidal vessels were visible in the background. The figure was apparently upon the same plane with the other portion of the fundus, and there was no defect in the visual field corresponding to the spot.

The appearance which the figure presents is in the highest degree striking. The sharply defined and elegantly outlined contour, the pure yellowish-white on the deep black ground, with the red vessels coursing over its surface, all combined to make an elegant picture, which reminded one of the most fantastically variegated carpet-pattern.

There can be no doubt but that it is a congenital anomaly. Against the fact of its being a result of choroiditis, we have the sharply-defined contour and the extraordinary regularity of the place under consideration, in spite of its large dimension; and furthermore, the totally different character of the recognizable choroidal vessels.

Besides, there was to be found nowhere else in the fundus any evidence of choroidal disease, nor was there any functional disturbance (defect in the visual field) corresponding to the affected locality.

Regarding the anomaly as congenital, we can put it side by side with the colobomas, especially those at the macula.

It is not necessary to call attention to differences between this and the ordinary coloboma as regards form, color, and vascularization. Nor does the position precisely agree with that of colobomas at the macula.

If it is difficult to understand how a coloboma can occur at so high as the region of the macula, it is still less conceivable how such an alteration should occur at the upper and outer side of the posterior pole of the eye. And yet I think that we should not allow the abnormal position alone to influence us against considering it as at least analogous to colobomas.

Mittelstädt¹ has reported three cases of undoubted coloboma of the iris, one of which was directly outward, while the two others were directly inward, from which we may justly infer that there may be deviations from the positions ordinarily occupied by colobomas.

¹These ARCHIVES, vol. ix, p. 427.

TWO CASES OF REMOVAL OF BIT OF STEEL FROM INTERIOR OF EYE BY MAGNET.

By J. LAUNCELOT MINOR, M.D.,

Assistant Surgeon to the N. Y. Eye and Ear Infirmary.

DURING last summer I treated the two cases whose histories are related below, and in each instance succeeded, with an electric magnet (Bradford's), in removing a piece of steel from the injured eye. In the first case, the eye, as an organ of vision, was lost before the patient came under my observation. In the second case, vision was fair when he was first seen, and useful sight was retained.

CASE 1.—H. N., æt. twenty-seven, machinist, presented himself at the New York Eye and Ear Infirmary on the 27th of June, 1882, just twenty-four hours after the eye had been struck with a small piece of steel, which the patient stated had entered, and still remained in, the globe. V = 0; globe injected; slight exudation in pupil; no reflex from fundus; media too cloudy to admit of view of interior of eye, and globe too tender to measure tension. At a point 3 mm. from the limbus, on a level with the insertion of the external rectus muscle, was an opening through the sclera and other tunics of the globe 2 mm. long, in a horizontal direction. The possibility of extracting the foreign body, and the probability of enucleating the globe having been explained to the patient, he consented to place himself in my hands. It was about nine o'clock in the evening, and I operated without an anæsthetic. The lids being held apart with a speculum, I began by enlarging the wound in the globe—making a vertical cut about 3 mm. long, which, being at a right angle with the original wound, gave a tri-

Removal of Bit of Steel from Interior of Eye by Magnet. 41

angular flap that could be lifted forward during manipulation of the magnet. This step I consider an important one, for it reduces to a minimum the danger of having the particle of iron scraped off when the magnet is withdrawn. I now cautiously introduced the magnet—using the smallest point that is made for the instrument—to a depth of about 6 mm., and then slowly withdrew it. Much to my satisfaction and somewhat to my surprise, the piece of steel came out with it, adhering to the point of the magnet. The piece of steel weighed 5 cgrm., was 4 mm. long, 1.5 mm. broad, and tapered to a fine point at each extremity.

The wound was closed with a conjunctival stitch, and the eye was kept constantly covered with iced patches, and atropine was used every four hours. The pain was at once relieved. The injection subsided, and the media cleared up sufficiently to allow a view of the interior of the eye by oblique illumination. The lens was clear, with some deposit on its anterior capsule, and the front and anterior part of the vitreous was also clear. A dense whitish exudation was observed all around the ciliary region and in the posterior part of the vitreous. The eye did well for several weeks, when pain again returned, and the eye was finally enucleated on August 10th, because it was deemed unsafe to allow the patient to return to his home in the country with a useless eye, that was liable at any time to endanger its fellow.

CASE 2.—G. L., æt. twenty-two, machinist, came to the New York Eye and Ear Infirmary on August 4, 1882, with a piece of steel in the left eye, that he had chipped off with a chisel from metal upon which he was at work one hour before I saw him. The piece of steel had entered the eye at its inferior corneo-scleral margin, passing through and beyond the cornea, iris and limbus of lens, and could be seen lying on the ciliary body. Slight cloudiness of the media prevented an easy view of the fundus and the examination was not persisted in. His vision was $\frac{1}{100}$ + and the V F showed no interruptions. He was at once placed upon the operating-table, and, without an anæsthetic, a slight enlargement of the wound of entrance was made, and the small point of a Bradford magnet was introduced just within the corneal wound, where it was held for a few moments with an idea of magnetizing the piece of steel. I was very pleasantly surprised at seeing the iris pressed forward toward the magnet, and through the opening in the iris the piece of steel present and attach itself to the point of the magnet. Owing to the jagged nature of

the piece of steel the iris caught upon it, and it was necessary to divide it as the steel was withdrawn thus making an iridectomy indispensable. The piece of steel weighed 1.5 *cgrm.*, was 6 *mm.* long, measured 2 *mm.* across at one end, and tapered to a blunt point at the other. There was some bleeding into the anterior chamber. The patient was put to bed and cold applications were kept constantly upon the eye, and atropine was instilled every four hours. Little or no reaction followed. The wound had united on the fourth day, and the blood disappeared from the anterior chamber a few days later. The case progressed favorably and the patient was discharged one month after the operation with vision of $\frac{20}{300}$. There were no inflammatory symptoms present, and the only opacities were in the lens and vitreous about the locality of the original wound. The lens showed also slight diffuse haziness.

I last saw the patient about the middle of December, when he had vision of $\frac{20}{100}$. The lens opacity was less in extent and density, and the diffuse haziness was also reduced. The opacities in the vitreous had also disappeared, and the fundus was normal.

Each one of these cases presents an interesting feature. The *first* proves that a piece of metal can, under favorable circumstances, be removed from the eye by a magnet, though its exact locality is unknown; and this suggests the careful use of the magnet in such cases. The *second* proves that the magnet is capable of attracting and moving a small bit of steel, when *in the vitreous*, a distance of 4 *mm.*, for the piece of steel was lying on the ciliary body behind the limbus of the lens, and the tip of the magnet was *not introduced deeper* than the corneal wound.

GLIOMA OF THE RETINA.

BY DR. U. VETSCH, OF ZÜRICH.

Translated by JAMES A. SPALDING, M.D., Portland, Maine.

TWO cases of glioma of the retina which I lately had opportunity of observing in their interesting complex of symptoms and course, led me to collect all the cases of this disease that had, up to this time, been observed at the clinic in Zurich.

Of the twenty-five cases which are entitled in the case-books as glioma of the retina, one has already been described.¹

My chief aim has been to discover exactly what became of each case, especially of those which were operated upon, in order to solve, if possible, the doubtful question of the curability of glioma. For this purpose, I made inquiries of the proper authorities in every parish in which each patient lived, and succeeded without a doubt in discovering the final outcome of every case.

Before giving the history of the various cases, we would remark, that throughout this paper, where nothing else is said to the contrary, the gliomatous structure of the tumor was definitely demonstrated.

In four cases in which the eyeballs still lay in Müller's fluid (case 14, enucleation, December, 1872; case 4, September, 1877; case 20, June, 1878; case 22, January, 1881), teased-out preparations showed other cell-forms than simple round cells. Some of these were provided with two or more

¹ *Zehender's Monatsblätter*, 1863, p. 341.

off-shoots of different lengths, and occasionally reminded us of the forms generally assumed by living cells in amoeboid movement. The longer the preparations had remained in the hardening fluid the more difficult it became to demonstrate these cells, but the fresher the preparation the more abundantly they were discovered. When the preparations are quite fresh, they seem to possess a decided number of these cells, as appears from the teased-out preparations of a freshly examined parotid tumor. It is difficult not to confound these cells with similar pictures, which are very confusing when remains of the interstitial tissue cling to the round cells. In order to come to a definite conclusion on this point, we must isolate the cells completely, and we can then at the same time convince ourselves of the origin of the off-shoots from the body of the cell itself.

This variation from the customary condition (small round cells) as described by Knapp,¹ Hirschberg,² Iwanoff³ and others, was a great surprise to me; but I was still more surprised to find that the same cells that I had discovered had already been described by Virchow⁴: "These cells are also small, with very moderate cell-bodies, which as a rule, are of rounded shape, yet sometimes irregular and provided with delicate off-shoots." "We occasionally meet with isolated fibre-cells provided with very long processes and a very slender and short body; it sometimes happens that several of these are united with one another." Virchow also cites (p. 156) Von Rapp,⁵ who in one case discovered somewhat irregular "globules" with granular contents, and in another, little bodies provided with tails.

It is a valuable fact that we have been able to demonstrate these cell-forms in the gliomatous tumors of the retina, since Max Schultze⁶ has shown that they appear normally in the connective-tissue part, the granular and intergranular layers of the retina.

¹ "Intraoculare Geschwülste," p. 56.

² "Markschwamm," p. 92.

³ *Archiv f. Ophthalmol.*, Bd. xv, Abth. 2, pp. 76, 77, 79, 83.

⁴ "Geschwülste," Bd. ii, p. 164.

⁵ *Von Ammon's Monatsschrift*, 1840, Bd. iii, p. 391.

⁶ "Observationes de retinæ structura penitiori," Bonn, 1859.

Virchow (*l. c.*, p. 129) is undecided whether such cells appear in the neuroglia of the brain substance, while, on the contrary, Deiters¹ demonstrated the existence of star-shaped cells with numerous fine off-shoots which anastomose and form a delicate fibrillar net-work. This observation was supported by Jastrowitz,² who described the so-called "arachnoid cells," and Boll³ with his "brush-shaped cells" from the spinal cord.

Virchow,⁴ Th. Simon,⁵ and Gogli⁶ have already made mention of similar ramified cells in gliomatous tumors of the brain.

My investigations of a fresh case of glioma of the brain, and the comparison of teased-out preparations of the same with preparations of glioma of the retina, convinced me that the same cells are discoverable in both cases.

I will not be so bold as absolutely to deny the occurrence of round cells, for I found them in my own preparations as well as in a large majority of eyes which had been preserved for a long time in Müller's fluid (in which case, however, we cannot exclude the unfavorable influence of the hardening fluid). Still, in my opinion, the tendency to call glioma a small-celled, round-celled sarcoma ought to be opposed.⁷

Lemke has lately described⁸ three cases of glioma (one of them a glioma of the retina), two of which contained round cells, the third polymorphous cells. He classifies glioma according to its cellular structure under three heads: (1) round-celled glioma; (2) glioma with polymorphous cells; (3) glioma with brush-shaped or spider cells.

Lemke divides the sixty-four cases which he has collected into twenty-five of the first variety, twenty-seven of the second, and eleven of the third.

¹ "Untersuchungen über Gehirn und Rückenmark," 1865, p. 27.

² *Archiv f. Psychiat. und Nervenkrankheiten*. Bd. iii, p. 168.

³ *Ibid.*, Bd. iv, 7.

⁴ "Geschwülste," p. 131.

⁵ *Virchow's Archiv*, Bd. lxi, Heft 1, 1874.

⁶ *Medic. Centralblatt*, 1875, No. 36.

⁷ Compare Nagel: *Jahresbericht*, 1871, p. 305; Hirschberg: these ARCHIVES, vol. x, p. 55; Alt: "Histologie des Auges," p. 199.

⁸ *V. Langenbeck's Archiv*, Bd. xxvi, Heft 3, p. 525.

"It is interesting to notice," says he, "that all of the round-celled gliomata but one (which had its seat in the cerebellum) were located in the eye. Of the polymorphous tumors, twenty-one were situated in the brain and spinal cord, five only in the eye, and one in the auditory nerve. The remaining cases (brush-shaped, etc.) were simply discovered in the brain, with exception of one, which appertained to the spinal medulla."

Amongst our twenty-four cases are two (Nos. 11 and 13) which must be excluded from the category of glioma. For in the former, the anatomical examination revealed "hyalitis," while in the latter, death did not ensue, although no operation was performed. (This must have been a case of suppurative choroiditis.)

On the contrary, in case 17, we made a diagnosis of suppurative irido-choroiditis, and only discovered the truth (glioma) after further observation.

These three cases, and especially the two former, in which glioma was unanimously diagnosticated by several observers, revealed once more the difficulty of a correct diagnosis between glioma and suppurative choroiditis.¹

Knapp (*l. c.*, p. 80) tries to differentiate the two conditions as follows: "The history, the whitish and dull reflex, and the never-failing symptoms of inflammatory degeneration, such as small grayish-brown synechiæ, frequent protrusion of the iris, and diminution in the size and tension of the eyeball, prevent us from confounding glioma with suppurative choroiditis and other inflammatory diseases."

Hirschberg (*l. c.*, p. 230) expresses himself in similar terms.

These distinctions, which *a priori* appear broad enough, have a much more limited significance in practice. Thus, in case No. 11, the tension was increased, and it was this very fact, conjoined with a widely dilated pupil, which led us to diagnosticate glioma of the retina, despite the fact that the history of the case showed a previous meningitis. In case No. 13, also, the globe was harder than that on the

¹ Compare also the case cited by Knapp (*l. c.*, p. 80), and described in *The Lancet*, 1854.

other side ; while, on the contrary, in four undoubted cases of glioma (Nos. 8, 10, 17, and 18) the globe was not hard to the touch. The degrees of tension, consequently, are far from being constant, while, additionally, the history of the cases is by no means reliable, since two of our cases of glioma (1 and 18) were preceded by meningitis.

Considering all these facts, it would seem desirable to demand a modification of Hirschberg's assertion, " that no one, in our days, should possibly confound a glioma with simple inflammatory changes."

The *relative frequency* of glioma is about 0.03 per cent.; in 75,000 patients we have met with twenty-three cases of glioma. This percentage is smaller than that which Hirschberg reckoned from v. Gräfe's material (0.05 per cent.).

Although all previous statistics show a large preponderance of cases in the male sex, our twenty-two cases were equally divided between the two sexes.

The appearance of the disease in the right or left eye was about equally divided; for in eleven cases the right eye was affected, in ten the left ; while in one case (No. 18), the affection was double at its first presentation. In three of the cases, however, the second eye became blind after the disease had made further progress (cases Nos. 6, 19, and 20).

The following table shows the age at which the glioma was *first perceived* :

Congenital	.	.	.	.	.	.	3 cases.
First and second year	.	.	.	.	.	.	5 " each
Third year	.	.	.	.	.	.	3 "
Fourth "	.	.	.	.	.	.	2 "
Fifth, seventh, and eighth years	.	.	.	.	.	.	1 case each.
Undecided (congenital, or in the first year)	.	.	.	.	.	.	1 "

The table agrees essentially with that given by Hirschberg (*l. c.*, p. 167), and as there, so here, the first and second years are chiefly affected.

It is quite plain, however, that the tumors must have begun at a much earlier date, and the above table suggests to us that most gliomatous tumors originate during foetal life.

In the three congenital cases (14, 16, and 21) one eye only was affected, while Hirschberg (*l. c.*, p. 168) usually found the disease in both.

The *etiology* of glioma is not cleared up by our cases. They simply confirm the fact that a special dyscrasia does not exercise any influence upon the origin of the tumor. If in one case or another (19, 22, and 24) the weakness and sickness of the children are mentioned, so in others (Nos. 6 and 7) their cheerfulness and health are emphasized. It is also very doubtful whether the few isolated diseases which preceded the appearance of the tumor can be accused as the cause of the glioma. Thus (in No. 23) we find "convulsions" mentioned, as well as whooping-cough followed by inflammation of the brain (case No. 1), whooping-cough with subsequent inflammation of the lungs (case No. 17), and inflammation of the brain (case No. 18). It is remarkable that other children in the same family have died from inflammation of the brain, while a sister of case 6, and two sisters of case 18, died of "convulsions."

This reminds us of those enigmatical cases in which several children of the same family have died of glioma of the retina.¹

In two cases (7 and 16) we find mention made of congenital asymmetry of the face.

Nothing is said in our note-books of injuries as the cause of the disease.²

The *symptoms* of the various cases under our observation do not differ from those usually given in the text-books. In one case (No. 9) the yellow reflex was preceded for a long time by divergent strabismus, and closure of the eyelids when looking at any thing bright, a fact which proves that the beginning of the glioma must be dated back several months before the first reflex from the pupil was noticed. Case No. 23 had a ring abscess of the cornea which is evidently to be referred to an unusual exhibition of glaucomatous increase of tension.

In seven cases we discovered a hitherto unobserved symp-

¹ These ARCHIVES, vol. viii, p. 381. *Ibid.*, iv, p. 7.

² Steinheim: *Centralblatt f. Augen.*, 1877, p. 172.

tom, megalocornea, which in three cases (8, 14 and 20) was accompanied with enlargement of the entire globe, particularly of the anterior segment, while in the remainder the cornea alone was enlarged. Such a coincidence in one third of all the cases cannot be accidental, so that we must in the future recognize megalocornea as a further symptom of glioma.

This condition must be referred, as a matter of course, to the glaucomatous increase of tension. And if we reflect upon the fact that all of these cases belonged to the earliest period of youthful life (with exception of case 24, the characteristic yellow reflex was perceived a few weeks or months after birth), we must come to the conclusion that the cornea of new-born children or of the foetus yields in circumference and sphericity to every increase of tension.¹

Prof. Horner (*ibid.*) goes even farther than this, and uses these cases of glioma with megalocornea as a direct proof that the opaque keratoglobus is a congenital glaucoma. According to this view, megalocornea is *a direct result of primary glaucoma*.

There is no doubt that these observations give decided support to the views first formulated by Dufour, that *congenital hydrophthalmus* is probably an intra-uterine glaucoma.²

In considering the *course* of the disease we must distinguish between the operated and the non-operated cases.

There were nine cases in which the operation was not performed, either from too far advanced condition of the tumor, or from the unwillingness of the relatives or patients.

I took considerable pains to gain from the parents of the patients some description of the symptoms under which the children died, in order to discover if possible the special cause of death. But, of course, any such classification based upon the accounts given by parents has but little value, since the glaucomatous ciliary neuroses may give rise to symptoms (loss of appetite, vomiting, etc.) which cause us to suspect cerebral inflammation (No. 8); while, on the

¹ Horner: "Krankheiten des Auges im Kindesalter," p. 342.

² "Festschrift zu Ehren von. Prof. Horner," 1881, p. 124.

contrary, in cases in which intra-cranial disease was demonstrated by the autopsy, no cerebral symptoms were present during life (No. 6). The symptomatology of metastasis to the liver is also thoroughly doubtful, and it is questionable whether in any given case we are to ascribe the ascites and œdema of the feet, to such a metastasis or to the existing cachexia.

In every case except No. 4, the tumor extended outside the eye; death ensued in one case from metastasis to the liver (No. 1), in another from hemorrhage (No. 3), in three (Nos. 2, 4, and 6) from intra-cranial propagation (supported in one case by post-mortem examination), in four (Nos. 5, 8, 19 and 22) from cachexia.

The duration of these cases which proceeded *without an operation* can only be calculated from the time at which the disease was *first noticed*. Eight cases thus showed an average duration of sixteen months.

Of the *thirteen cases which were operated upon*, five are still alive; the fatal cases are tabulated below.

The symptoms under which death ensued were unknown in one case (No. 7); in three others (9, 10, and 15) the brain seems to have been affected (confirmed in one case by autopsy), while in the rest the patients appear to have succumbed from exhaustion, although violent headaches may have been noticed.

The tumor reappeared in five cases in the orbit on an average duration of six weeks, and caused death after an average period of eleven weeks. The whole duration of the disease (with the previously mentioned restrictions) averaged in these fatal cases twenty-one months, or fourteen months if we exclude the very slow congenital case No. 16. The duration of the disease is consequently rather shorter than if the affection is allowed to proceed spontaneously, although death was not directly caused by the operation in any case.

Symptoms of extension of the tumor outside the eye-ball (protrusion of the globe) were already present in five cases at the time of the enucleation. Hence it would seem proper in the future to exenterate the orbit at once in all

such cases, and all the more since later observations have shown that this operative interference is frequently very effective.

No.	Symptoms of intra-ocular expansion of the disease before the operation.	Duration of the disease from the beginning to the operation.	Method of operation.	Duration of the disease from the operation to the relapse.	Duration of the disease from the relapse till death.	Total duration of the disease.
7	Protrusion	6½ months	Enucleation	1 week.	3½ months.	10 months.
9	Eye-ball protruded outward and downward	18 "	Enucleation with neurectomy	1½ months. 2½ "		19½ "
10	Eye-ball somewhat protruded	1½ "	Enucleation	1½ months.	2 months.	4 "
15		4 "	Enucleation	Followed by exenteration of the orbit.		7½ "
16	. . . . .	61 "	Enucleation with resection of the optic nerve	3½ months.		64½ "
18	Exophthalmos. Sclera perforated.	10 "	Enucleation	4 weeks.	4½ months.	15½ "
21	Eye excessively protruded	24 "	Enucleation	1½ months.	3 "	28½ "
24		12 "	Enucleation	2½ "	1 month.	15½ "

Nellessen¹ published a case in which after a relapse into the orbit the whole cavity was exenterated, and the periosteum scraped off with a sharp spoon. The child was still alive four years and three months later. Brière² has also published one in which after extirpation of the relapsing tumor and cauterization of the inner surface of the orbit no relapse had taken place at the end of ten months.

It is quite plain that energetic interference should become more and more the rule; and, above all, we should insist that the operation for glioma is *one of the most URGENT* in surgery. A few days' delay may be fatal in the presence of a tumor of such rapid advance as this. Still, the fault in delaying the operation is more often attributable to the parents than to the physician.

Experiments like those of Albini (destruction of a retinal

¹ Inaugural Dissertation. Halle, 1872.

² *Ann. d'Oculistique*, t. lxxxi, p. 35.

glioma by means of a solution of chromic acid)¹ might just as well be omitted, considering the usual course of the disease.

We should not, on the whole, be influenced by the uncertainty of the diagnosis in these cases. We should not, like Mackenzie,² dissuade any one from the operation in the intra-ocular stage, but interfere actively in every case which is *probably* a glioma of the retina, even going so far as to run the risk of enucleating an eye which is blind from irido-choroiditis.

We shall do but little harm, at the most, in an occasional case, while often we shall do an immense amount of good.

Amongst the five cases of recovery after an operation, one (No. 17) deserves our especial attention. In this case, although the orbit has remained perfectly intact, a relapse appeared in the parotid gland after an interval of three years. The microscopic examination of the second tumor revealed the same elements as in the original growth. Primary gliomata of the parotid gland have never been observed,³ hence the tumor in this case must be regarded as a relapse of the glioma. We are consequently forced to the conclusion that more than three years before, even before enucleation, the parotid gland had become affected by metastasis; that the germs of the tumor remained intact through three entire years, perhaps increased in a scarcely noticeable manner, in order, finally, excited by an operation (incision), to awake into all their danger.

This fact allows us :

(1) To confirm the experience that in a few rare cases the growth of the glioma is extraordinarily slow. Or, in the words of Mackenzie⁴: "The neoplasm may remain stationary for as many as three entire years, and then in a few weeks after beginning to advance, it may enlarge the eyeball three- or fourfold."

A second case (No. 16) strengthens the above assertion, for in this at the time of birth the left pupil was not entirely

¹ These ARCHIVES, vol. viii, p. 387.

² Cited in Hirschberg, *l. c.*, p. 234.

³ Virchow: "Geschwülste."

⁴ Hirschberg, *l. c.*, p. 214.

black, but larger than the right; still the tumor did not begin to grow rapidly until the child was five years old. I should not venture to sanction the history of the case as given by the parents, did not an undeveloped auricle and congenital facial paralysis increase the probability that the tumor also was congenital.

(2) To draw the conclusion that the cure cannot be said to be absolute until at least three and a half years have passed without relapse, or, as Chelius says: "Even when the result after two or three years seemed brilliant and permanent, yet death was caused by the appearance of a glioma in other portions of the body, although the cicatrix of the operation remained in the best condition." Hirschberg, however, grants this (*l. c.*, p. 243) assertion, so far as sarcoma of the choroid is concerned, but not in the case of glioma of the retina.

The same case (No. 17) is worthy of notice, since, despite the fact that the eye was filled with the tumor and the sclera already perforated, yet no local relapse appeared.

Case No. 20 (left eye) was without relapse for three years and a month, while in the right eye glioma appeared, quite independent of the left. This case is analogous to two similar cases described by Hirschberg and Happe,¹ and by Agnew, as cited in Vogler.² While, however, in these two cases, enucleation of the second eye was undertaken, and a radical cure obtained in Agnew's case (*postea*), we could not decide in favor of such a procedure. Although from the strictly medical stand-point of *saving life* such a step is permissible, and perhaps even ordered, yet, on the contrary, it seems inhuman thus to preserve life to a blind child. It would appear most suitable to cling to the old rule, *not to operate when the disease has affected both eyes, and not to operate again* when the disease also affects the previously healthy eye.

In case No. 23, no relapse had occurred eight months after the operation.

In addition to these three temporary recoveries, we have

¹ *Gräfe's Archiv*, xvi, 1, p. 297, and these ARCHIVES, x, 65.

² These ARCHIVES, viii, 387.

two undoubted results to subjoin: case No. 12 with no relapse for nine years, and case No. 14 for seven years.

The *literature of permanent recoveries* may here be cited.

1. Hirschberg ("Markschwamm," p. 251), six years.
2. Hirschberg (*ibid.*), seven years.
3. Hirschberg (*ibid.*), twelve years and six months.
4. Nellessen (*ubi supra*), four weeks and four months.
5. Landesberg (*Gräfe's, Archiv*, Band xxi, page 95), six years.
6. Hirschberg (Vogler: These ARCHIVES viii, 385), three years and six months.
7. Agnew (Vogler: *ibid.* 387, and *Centralbl f. Aug.*, 1880, 330), six years.
8. Nettleship (R. L. O. H. Reports, vol. ix, p. 56), five years. But the note: "Mr. Critchett informs me that he believes the child to be still alive and well, having heard nothing of the case since the operation," gives rise to doubt regarding the success of the operation.

9. Lawson reports a case of Hulke; six years without relapse (Vogler; these ARCHIVES, viii, 388).

We will now add a brief *résumé* of our cases, twenty-four in number.

1. Johann F., æt. three years; 22d August, 1862; had the whooping-cough last autumn; followed by inflammation of the brain. The right eye altered in appearance since April; pupil very wide, and the retina extensively detached, downward and outward.

May 9, 1864.—An enormous tumor projects from the right orbit. The patient died November 11, 1864, with symptoms of "dropsy."

2. Johann L., æt. five years; June 5, 1864. The left eye (without assignable cause) has been affected since November; tension harder than in the right eye; pupil dilated, yellow reflex.

October 31, 1864.—Large extra-ocular tumor, severe headaches, obstinate vomiting, etc.

February 18, 1865.—Death.

3. Barbara Z., æt. six months; August 1, 1864. The right pupil has a yellowish reflex, and a tumor covered with vessels is visible within it to the naked eye.

February 21, 1866.—The tumor has penetrated near the rectus inferior.

July 3, 1866.—Death. "The tumor enlarged enormously; occasional hemorrhage took place from it and materially weakened the child."

4. Emma G., æt. seven years ; August 17, 1865. The right pupil was observed to be very much dilated, only sixteen days before. A detachment of the retina without a tumor is visible. The father declines the proposed enucleation. From November, 1866, the child complained of weariness and headache ; then ensued attacks of total loss of consciousness. Death, March 11, 1867.

5. Ludwig F., æt. three and a half years ; August 27, 1865, Reflex from the right eye since June. Right pupil wide, iris discolored. A citron-yellow reflex is visible from the thick mesh-work of neoplastic vessels on the surface of the protruded retina.

According to the mother's report, the tumor grew out of the eye, and the child died February 9, 1866. It had never complained of headaches ; it did not vomit, nor have convulsions. It appeared to die simply from exhaustion ; no hemorrhage.

6. Cassimir P., æt. two years ; October 7, 1868. A bright and cheerful child, the youngest of nine, one of whom (the fourth child), a sister, died at the age of nine months, " of convulsions."

The parents noticed a white spot in the right eye eight months before ; divergent strabismus for four months. Death, May 18, 1869, previous to which the diseased eye had been of enormous size. Convulsions and vomiting were absent and the consciousness always preserved. The healthy eye became blind a short time previous to death. Intracranial propagation.

7. Anna R., æt. four ; 30th December, 1868.

The child began to complain of pain in the right eye a week before. But a neighbor had noticed as far back as August that the eyes were " different." A healthy child, but somewhat pale.

Asymmetry of the frontal bone, slight œdema of the right upper eyelid ; right eye slightly protruded, but its motions unimpeded. Eyeball hard, anterior chamber shallow, pupil moderately wide and immovable ; yellow reflex. The fundus of the eye lies close to the posterior-capsule, and exhibits a homogeneous yellow structure with long furrows.

May 9, 1869.—Lens dislocated inward, and lying against the cornea. Transparent scleral staphyloma close to cornea. The patient sleeps a great deal, but does not complain of headache.

May 11th, 1869.—Enucleation ; optic nerve gliomatous.

May 18th.—Relapse.

August 28, 1869.—Death ; no details.

Macroscopic description of the preparation.—Anterior chamber

abolished, periphery of the lens applied to the cornea, and the lens pushed inward by tumor, which has squeezed itself between the latter and the ciliary body. Ciliary body infiltrated. The choroid is thickened, except near the optic nerve, where are several nodules of various sizes. At the macula it is 8 *mm.* thick, and intimately connected with a crumbling tumor which belongs to the detached retina and completely fills the ocular cavity.

The optic nerve 8 *mm.* behind the globe measures 6 *mm.* in thickness.

8. Johann B., æt. thirty weeks ; 8th December, 1870. Six weeks after his birth the left pupil was gray. When the boy was fourteen weeks old the left eye began to grow large, and had increased rapidly in size in the last three weeks.

Left eye bulged directly forward (4 *cm.*) ; cornea dry, yellow, and larger than the right. Globe also enlarged, but soft. Behind it an elastic tumor. DIAGNOSIS : Glioma of the retina, which has extended along the optic nerve and moderately developed in the orbit.

December 19, 1870.—Death, after the tumor had increased still more in size and the cornea had broken down. Death was preceded by loss of appetite, obstinate emesis, and violent shrieking. Nothing abnormal in the brain.

9. Louisa V., æt. two and a half years ; 20th January, 1871. The right eye began to squint outward, and to close when exposed to too bright light, in the previous July. White reflex during the last eight weeks. Right pupil enlarged *ad maximum*, anterior chamber very shallow, lens pushed forward, eyeball hard, yellow reflex.

The anterior (nasal) surface of the glioma is partly covered with numerous neoplastic vessels, and partly with large flat extravasations. Between the nasal and temporal portions of the tumor lies the detached retina like a vertical fissure.

January 4, 1872.—Right globe stony-hard, and protruded outward and downward ; the child has continuous and frequently violent pains, and hold its head while groaning ; emesis.

January 5th.—Enucleation, with subsequent excision of a portion of the gliomatous optic nerve half an inch long. At first the operation seemed successful, the general condition improved, but on 13th January, emesis and terrible headache reappeared.

February 2d.—Condition about the same, great emaciation, left pupil dilated and immovable. The ophthalmoscope showed nothing but engorged veins.

February 15th.—Death. The right orbit was completely cicatrized, and the optic nerve as large as a lead pencil; the left optic nerve slightly thickened, and its sheath very much injected.

The space between the two optic nerves is occupied by a very vascular, soft, pulpy neoplasm, which appears like a projection of the lower surface of the right temporal lobe. The floor of the third ventricle is curved steeply downward and thickened, while the ventricle itself is occupied by a soft grayish-red neoplasm the size of a walnut. A vascular, round, and extremely soft neoplasm has penetrated the floor of the right lateral ventricle, and appears to be connected with the tumor in the third ventricle, and only separated from it by the right limb of the fornix. The liver is somewhat enlarged and interspersed with numerous superficial and central white and reddish pulpy nodules as large as a bean or hazel-nut.

Macroscopic description of the enucleated eye: the whole of the space behind the lens is filled with the tumor, the anterior half of which is white and crumbling, the posterior half firmer and slightly pigmented. The tumor extends directly into the choroid which is still present in the anterior portion of the globe. The retina has disappeared.

10. Samuel C., æt. eight years; March 22, 1872. The patient, for the first time in his life, complains of pain and lachrymation in the right eye. The globe is not hard. A whitish-yellow mass, covered with extravasations, lies behind the lens and occupies most of the inner and lower portions of the eyeball. The upper surface of the yellow tumor shows a *white isolated nodule, which protrudes entirely from the structure.* This circumstance induced us to believe in the possibility of a cysticercus, in addition to a glioma. But in the further progress of the case we saw that the tumor gradually increased in size, and separated the iris from its ciliary attachment, and with its grayish-red granulomatous surface became visible between the iris and sclera. The globe at the same time became exceedingly hard, but did not protrude.

April 13.—Enucleation; recovery without any accident.

June 29.—The patient was suddenly attacked with violent pain in the left kneejoint, and convulsions. He became sleepless, and died July 3d.

Description of the preparation : Lens pressed forward, retina detached, and metamorphosed into a tumor filling the larger portion of the eyeball. The anterior portion of the choroid and ciliary body infiltrated and thickened (4 mm.) ; posterior half of the choroid and iris apparently uninvolved.

11. Caroline W., æt. two years ; April 8, 1872. Patient was attacked about Christmas, 1871, with meningitis, convulsions, and loss of consciousness. Ten days later the right pupil was enlarged, and showed a bright reflex. The globe is hard and the pupil dilated *ad maximum*. A tumor arises from the inner side of the retina, and is covered with extravasations and blood-vessels.

The autopsy, however, showed that the case was not a glioma, but simple hyalitis. Enucleation was performed April 18th, the child discharged April 30th, and was bright and cheerful till May 16th. Death followed after a short illness, which, so far as we could learn, was evidently of cerebral origin. The relatives did not notice any thing especial in the orbits.

12. Lina G., æt. thirteen months ; December 3, 1872. The right eye has been affected for nine months. The cornea is much larger than the left, and cloudy. The yellow tumor is visible behind the lens.

December 14th.—Enucleation. The father writes that the child is still perfectly well, and that the left eye has continued unimpaired (ten years).

Description :—Periphery of the iris adherent, lens resting on the cornea, choroid intact. The retina is detached in the shape of a cord by a fluid exudation, and at the posterior pole of the lens passes over into an irregular knobby tumor as large as a bean (10 mm. in its general dimensions). The transverse diameter of the eyeball is 21 mm., the sagittal 22 mm., the diameter of the cornea 13 $\frac{5}{16}$ mm.

13. Vincentz H., æt. two and one-half years ; February 11, 1873. Convergent strabismus for one year and a half in the right eye, in which for six weeks a "peculiar" glitter has been noticed. The patient was never sick, but slow in learning to sit and walk alone. Right anterior chamber shallow, globe not prominent, and capable of movement in all directions ; it is somewhat harder than the left. The outer portion of the retina lies close to the cornea, while the inner portion is only detached and less projecting.

July 18, 1881.—The boy is still well, although the proposed operation has never been performed. The eye is amaurotic.

14. Albert B., æt. eight months, September 23, 1874. The parents noticed from his birth that the left eye was abnormal. The front of the eye and the cornea are much enlarged. The yellowish-white protruding fundus covered with vessels can be easily seen behind the transparent lens. Tension + 1. A month later the eye was enucleated. The boy is now healthy and goes to school. Dr. Pfüger, of Lucerne, informs me that the tumor was undoubtedly a glioma.

15. Regina N., æt. two years; March 11, 1875. The left eye has been affected since last December, and now appears more prominent than the right.

April 2.—Enucleation; relapse in six weeks; exenteration of orbit; relapse. The child died in six or eight weeks with cerebral symptoms. Hydrops of the lateral ventricle, and nodules of glioma at the intracranial portion of the optic nerve.

16. Emil S., æt. five years; January 24, 1876. At birth the left pupil was slightly gray and larger than the right.

The left auricle is quite rudimentary and dependent; the left half of the face smaller than the right; left facial paralysis from birth.

Left eye glaucomatous, pupil very large, cataract; yellowish-red reflex.

February 19th.—Enucleation and removal of the entire optic nerve.

March 18th.—The boy is suffering with headaches, epistaxis, and general weakness; loss of appetite.

May 30, 1876.—Death.

Description of the preparation.—The interior of the eye is filled with a tumor, which in front is finely, and behind coarsely, pigmented. The retina is entirely lost in the tumor, while of the choroid only portions are visible at the equator. The optic nerve (attached to the eye) is 1 cm. long, 7 mm. thick, and is nowhere distinctly defined from the tumor in the interior of the eye. Posterior pole of the sclera bulged and thinned.

17. Anna M., æt. one year; June 30, 1876. The child became ill in January; whooping-cough, followed by inflammation of the lungs; since then the right eye "has looked queer."

Right pupil much dilated; a yellow reflex from the lower and inner portion of the vitreous chamber. Tension normal.

By lateral illumination it seems as if this were a case of inflam-

matory cicatrix, subsequent to irido-choroiditis. Eye sensitive and slightly divergent.

July 6, 1877.—The whole field of the pupil is filled with a yellowish-red tumor, which below has extended forward as far as the cornea, carrying the lens before it. A nodule of the tumor as large as a pea has already penetrated the sclera. Tension normal.

September 4th.—Enucleation.

Description of the globe.—A solid tumor fills the interior of the eye. A nodule of the same has penetrated the sclera at the corneo-scleral junction. The optic nerve is cut off short and not thickened.

July, 1881 (four years later), the child came to the hospital with a large tumor in the right parotid region, which had made its appearance in October, 1880. It grew at first very slowly, but becoming soft after being painted for months with tincture of iodine, it was incised in March, 1881. Latterly it has grown with great rapidity.

The child is well nourished and sound. The right orbit is empty, and the mucous membrane healthy. A soft tumor, as large as one's fist, lies in the right parotid region. The over-lying skin is movable, and entirely free from attachments to the tumor. The tumor itself is also wholly disconnected from the inferior maxillary base; nor does it extend toward the pharynx. No swelling of the glands. No cerebral symptoms.

Ophthalmoscopic examination of the left eye shows nothing abnormal. Objective condition of the thorax and abdomen normal.

A gliomatous relapse of the right parotid gland was diagnosed, and the total extirpation of the tumor accomplished (July 16th) under antiseptic precautions.

July 27th.—Boy went home after perfect recovery by first intention.

Microscopic examination of the deliquescent tumor: Sections show a small-cell, round-cell sarcoma, with moderately abundant fundamental tissue. Traces of spindle-cells are occasionally seen along the course of vessels. Teased-out preparations, however, show a large number of those polymorphous cell-forms previously mentioned, as well as small round cells and spindle cells. The cells, on the whole, correspond with those of the original tumor and of cerebral glioma. The father wrote us in September, 1881, that the child was cheerful and well.

18. Barbara B., æt. two years; January 7, 1877. In May, 1876, "inflammation of the brain," simultaneously with two sisters, aged five and six years, who died.

The yellowish color of the pupils was first noticed at the beginning of the winter.

Left eyeball: tension normal; total detachment of the retina, beneath which a thick whitish-yellow mass is visible.

Right eye.—A very convex whitish-blue tumor (5 PDD) is visible in the external half of the retina.

The left cornea was perforated by the tumor in July. This was followed by exophthalmus. At a later date the right eye also became blind.

August 24, 1877.—Enucleation of left eye.

Relapse a few weeks later. At the end of six months the tumor reached 35 *cm.* in circumference, and the child's neck and mouth were so swollen that nourishment could not possibly be taken.

February 8, 1878.—Death.

19. Gottlieb F., æt. two and one half years; July 5, 1877. Has always been a very weak child, but never seriously ill.

The left eye has been painful and red for five days. Pupil wide, globe hard, funnel-shaped detachment of the retina by a tumor. The child is very dull and apathetic.

Report from the pastor: The left eye protruded more and more from its cavity, as the latter became filled with a sponge-like tumor. Nine months later the right eye suddenly became blind, and the child died September 29, 1878, of exhaustion.

20. Eliza N., æt. seven months; May 31, 1878. The parents had noted for three months a yellow reflex from the left eye.

Left eye.—Megalocornea. The globe also is considerably enlarged and hard.

The ophthalmoscope shows a yellowish tumor at the left, covered with vessels and extravasations.

June 20th.—Enucleation of the left eye.

Description of eye: The iris and ciliary body have disappeared, and the lens lies close to the cornea. A small cord, evidently the detached retina, passes from the posterior surface of the lens to the optic papilla. At both sides of this cord extends a compact tumor, which reaches to the sclera in front; does not quite fill up the interior of the eye behind, but leaves a space which had evidently been occupied by a serous fluid.

August 21, 1881.—*Left eye:* No trace of a relapse. *Right eye:* A yellow reflex from the fundus of the eye for one year, in spite of which the child still saw well and ran about. Amurosis did not appear till New Year's day. No protrusion; movements of the eye normal. Since losing its sight, the child has not attempted to walk; no cerebral symptoms.

21. Paulina H., æt. two years; January 27, 1879. The father noticed a "spot" and a dull reflex in the left eye, directly after the birth of the child; yellow reflex for five weeks; eye hard; pupil wide, and a knobby tumor behind the lens. Incipient cerebral symptoms.

The father gave the following information concerning the course of the disease:

A few weeks after the enucleation (February 5, 1879), new tumors appeared upon the right half of the forehead as well as in the left orbit, increased in size, and finally covered the whole face. The child gradually became exhausted, but retained consciousness to the last. On the day of its death (June 15, 1879), spasms in the hand, feet, and face.

22. Francisca M., æt. three years; October 4, 1879. The right eye of this weakly child has been affected for about a year. Cornea dry and phthisical; above it a tumor as large as an apple, still covered with conjunctiva and extending backward into the orbit.

The child died January 9, 1880. The gliomatous tumor had already spread down over the face.

23. Albert T., æt. seven months; November 5, 1880. Child subject to "convulsions." The brilliant reflex of the left pupil was first observed at night six weeks before. Diameter of the cornea (13 mm.) larger than that of the right. The cornea is also opaque, and shows the symptoms of a ringabscess. The globe is harder than the right; yellow reflex from the detached retina.

December 9, 1880.—Enucleation.

The gliomatous tumor fills the entire vitreous chamber, but does not extend beyond the iris. The choroid is intact, the retina invisible, the sclera not perforated.

July 24, 1881.—The child is still perfectly well.

24. Rudolf G., æt. two and one quarter years; January 15, 1881. The child is weak, and has had a yellow reflex from the left pupil for one year. Megalocornea (14 mm. Diameter of right cornea 11 mm.). The lens is dislocated outward and

downward, and is cataractous. A knobby yellowish-red tumor is visible in the field of the pupil. The eye is noticeably protruded, and the lids very much swollen.

January 22d.—Enucleation ; for which purpose the external canthus had to be divided.

Examination of the globe shows that the whole vitreous chamber is filled with the tumor ; the choroid invisible to the naked eye, except in the anterior segment of the globe, and the retina entirely absorbed in the tumor. The eyeball is bulged at the posterior pole, at which the sclera is thinned, and Tenon's capsule thickened (3 mm.).

The optic nerve is apparently intact, 10 mm. long, and shows indications of a glaucomatous excavation.

May 1, 1881.—Three relapsing tumors were discovered in the left orbit. The father informed us that the child died May 13th.

A CASE OF CYSTICERCUS CELLULOSÆ IN THE
VITREOUS; EXTRACTION OF THE PARASITE;
PRESERVATION OF THE EYE AND OF THE VIS-
UAL POWER PRESENT.*

BY C. G. HAASE, M.D., HAMBURG, GERMANY.

Translated by ISIDOR FURST, New York.

ON Jan. 26th of this year, a patient was admitted to my ward with the diagnosis "detachment of the retina."

The patient, æt. twenty-one, a shoemaker, stated that he had never been sick, and asserted that he had never suffered from tape-worm. Only for the past two weeks he had observed a veiling of the right eye, which was followed a few days later by a small black ring surrounded by a larger one. During the examination instituted the next morning, it appeared that there really existed a detachment of the retina in the right eye; but in the centre of the detached portion, which was situated above inward from the papilla, a perforation had taken place, from the opening of which protruded the head and neck of a cysticercus in the most active motion. Through the diffuse and scattered greater opacities suspended in the vitreous, the details in the fundus, especially the papilla and the retinal vessels, could be seen only indistinctly and as through a veil. The head of the cysticercus, the vesicle of which was still attached partly in and beneath the retina, was, as above stated, in very active motion. Now it was directed upward, then downward, then to the right, and again to the left; at the same time could be observed great activity of the suckorial disks, recalling the motions of the tentacles of snails.

* From a paper read before the Medical Society of Hamburg.

We immediately attempted a drawing of this interesting picture, but the motions of the parasite were so quick that, after just finishing a sketch and a few minutes later again looking into the eye, a completely altered appearance was found. Although the retinal detachment was not very extensive, the visual power of the patient was reduced to the perception of movements of the hand at a distance of two to three feet. After a few days the aspect in our patient had altogether changed. The cysticercus, heretofore still partly attached beneath the retina, had now completely perforated the latter and floated in the posterior vitreous chamber in the form of the well-known blue vesicle with shining margins. The spot where the retina had been detached, could still be recognized by the dirty yellowish stripes. Externally, the eye was free from every appearance of irritation, nor did the presence of the parasite in the eye of our patient cause the least inconvenience or pain. According to A. v. Gräfe and other authors, a space of time of from three months to two years will suffice, if a cysticercus is present in the eye, to completely destroy the latter by irido-choroiditis. However, that this lapse of time is not always sufficient for the destruction of an eye, is proved by a case of cysticercus in the vitreous which I had an opportunity to observe for more than three years, not the least symptoms of irritation of the eye appearing during that time. This latter case, in which the parasite and all its motions were very distinctly visible, I had exhibited, in 1870, to a large number of physicians, and of late I have made strenuous endeavors to find the patient again and bring her before the Society, together with the present patient, but did not succeed. Possibly she may have died or emigrated. She most emphatically declined the extraction of the parasite, which had been repeatedly proposed to her at the time, because it did not cause her the least inconvenience.

To be sure, such an exceptional course must not induce the physician to refuse or neglect the operation for the removal of the parasite. Sooner or later every eye affected with a cysticercus is bound to perish, and may even have injurious consequences on the other eye by the inevitably occurring irido-choroiditis. Should vision be entirely lost, the form of the eye have suffered by the inflammatory process, and the patient be tormented by violent pains, we would prefer to perform enucleation at once, as the most certain method of removing the parasite. The sooner the operation is done, and the less the eye has suffered by the presence of

the cysticercus, the better the results obtainable by the extraction. The experiments made by A. v. Gräfe to kill the worm by instilling anthelmintics into the eye have been given up by him as without effect.

On February 9th, I performed the extraction of the cysticercus under chloroform, by the method introduced by Alfred Gräfe under the name of "meridional scleral section." The globe having been drawn inward as far as possible, I first made an incision into the conjunctiva, one to one and a half *cm.* in length, as far back as feasible, and detached it on both sides of the incision so as to expose the sclera. The hemorrhage having been completely arrested, I made an incision, eight to ten *mm.* in length, with a small cataract knife, down to the vitreous; I then waited some time, hoping that the cysticercus perhaps would spontaneously come out through the gaping wound or be perceptible. As this did not occur, I introduced a small iris forceps twice into the vitreous in order to seize the worm, but in vain. Therefore I widened the wound with small scissors by a few millimetres, and the cysticercus, after another introduction of the iris forceps into the vitreous, subsequent to its withdrawal spontaneously fell into the conjunctival sac.

To my great surprise, as well as that of the physicians present, the operation passed without appreciable loss of vitreous. Now I first joined the scleral margins and then the conjunctiva bulbi by two catgut sutures respectively, and applied a pressure bandage; the operation, like all those performed for several years in the eye wards, was done under spray and all antiseptic precautions. The healing of this wound—a large one comparatively for the eye—proceeded without the slightest reaction. On the following day, the conjunctiva was slightly swollen and injected only at the point of incision and around the sutures, but not even reddened at the remaining circumference of the globe; cornea, aqueous humor, and iris likewise showed quite normal conditions. In the course of the next few days, there were some slight injection and swelling at the point of incision, probably partly caused by the sutures, which I allowed to remain quiet. Therefore, for the succeeding eight days I kept on a pressure bandage, so as to obtain as complete a healing of the wound as possible, and to avoid an ectasia at that spot. On the thirteenth day after the operation, I again exhibited the patient to the medical society.

Vision was still the same as before the operation—that is to

say, the patient saw movements of the hand at two to three feet ; possibly the visual power will improve in time, when the detached retina has become permanently replaced, and the vitreous opacities due to the presence of the cysticercus and the operative interference have disappeared. It was impossible to determine whether the eye had had normal vision previous to the affection. The diameter of the vesicle of the extracted cysticercus was eleven *mm.* ; the length of the parasite, including its head and neck, sixteen to seventeen *mm.* ; hence one of the largest specimens removed from the eye. The ophthalmoscopic examination of the patient, about two weeks after the operation, showed :—vitreous filled with isolated small flaky and diffuse opacities, so that the details of the fundus could be recognized only with difficulty. The point of the retinal detachment, above-inward from the papilla, is still distinguishable by dirty grayish-blue folds, and the papilla perceptible only by its converging vascular trunks, its outlines hazy, as if covered with an exudation which seems to extend into the retina. The former incision looks like a fresh choroidal rupture. The sclera is seen exposed, retina and choroid have been retracted from the margins of the incision to a distance of half a papillary diameter. The stripe is narrowest in the centre, and expands upward and downward ; in some places small fresh extravasations of blood seem to be present. The eye itself appears free from irritation, and the patient experiences no inconvenience.

To the best of my knowledge, Alfred Gräfe¹ was the first to attempt the extraction of a cysticercus situated in the most posterior part of the vitreous, and subretinally in the neighborhood of the optic nerve—an operation well known to have been looked upon as a *noli me tangere* by A. v. Gräfe in 1868. In a series of cases published by Dr. v. Kries² and himself, the extraction of the parasite succeeded completely, not only the form of the eye being preserved, but the retinal detachment permanently cured, with a greater or lesser retention of the visual power. Only in two of the reported cases did the extraction of the parasite fail. A similar case of extraction of a cysticercus with

¹ Weitere Bemerkungen über die Extraction des Cysticercus von Alfred Gräfe. *A. f. O.*, xxiv, 1, pp. 161–210.

² Casuistische Mittheilungen aus der Augenklinik des Prof. A. Gräfe, Halle. Von Dr. N. v. Kries. *A. f. O.*, xxiv, 1, pp. 148–160.

preservation of the eye and vision was reported by Herman Cohn.¹

It is well known that the occurrence of cysticercus is very variable in different countries, corresponding to the mode of life of the inhabitants. According to v. Gräfe's statements, among 80,000 eye-patients treated by him in Berlin, one tenth per cent. are said to have been affected with cysticercus; while Hirschberg² found one cysticercus among 500 patients, or one fifth per cent., as stated by him in connection with the demonstration of an extracted cysticercus. Wecker, among 60,000 eye-patients, observed only a single case of cysticercus, and Mauthner not one among 31,000. A. Gräfe, of Halle, claims to see, among 4,000 to 5,000 patients annually, five to six cases of cysticercus, or rather more than one tenth per cent. I, myself, among 30,000 patients treated by me in Hamburg, have seen altogether five cases of cysticercus, of which one was beneath the retina, two in the vitreous, and two beneath the conjunctiva. The latter two I removed without any difficulty. The case of subretinal cysticercus, and that situated in the vitreous mentioned above, refused the operation, and I can report nothing as to the final result, as I have lost sight of both patients.

¹ Extraction eines subretinalen Cysticercus mit Erhaltung des Sehvermögens von Prof. Herman Cohn, Breslau. *Centralbl. f. A.*, von Prof. J. Hirschberg, 1878.

² Kleinere Mittheilungen von J. Hirschberg. *Centralbl. f. A.*, 1879, p. 173; comp. also Hygienisches aus der Augenklinik von J. Hirschberg. *Börner's Zeitschr.*, 1876, No. 6.

REPORT OF THE EIGHTH SERIES OF ONE
HUNDRED CONSECUTIVE CATARACT-
EXTRACTIONS, WITH REMARKS.

By H. KNAPP, M.D., OF NEW YORK.

THE present series of cataract-extractions is the continuation of the seventh hundred on which I reported, September, 1881, in the 10th volume of these ARCHIVES, p. 295, etc. The method of operating has undergone some alterations. The corneal section gradually shifted from the peripheric-linear of V. GRÄFE into the circular-marginal of DE WECKER. The excision of the iris in cases where the capsule was healthy, has been less extensive than before. The opening of the capsule has been subjected to some experimental variation in its execution, of which none, however, has shown a superiority over the method described in my former reports, namely, the peripheric incision along the corneal section with a sharp needle-cystotome. The expulsion of the lens was effected in all cases by external pressure, even if in complicated and hypermature cataracts the lens was intentionally expelled together with its unbroken capsule. The removal of cortical remnants has been done less persistently than before. The utmost care has been taken to prevent any foreign substance—conjunctiva, blood, iris, capsule, and portions of lens tissue—from remaining in the wound. In every step of the operation I have aimed at the greatest simplicity and accuracy of execution, in order to avoid all preventable accidents, to secure primary union of the wound, and ward

off, as much as possible, any kind of irritation in the healing process. Though I am convinced that the strict observance of these rules forms the fundamental conditions of success—the essential precautions—in the extraction of cataract, I have used antiseptic means in every other case of this series, yet in such a way that they could have no irritating effect on the delicate structures of the eye.

Usually a subsequent central division of the capsule was required to secure permanently good visual results. Thus far, I have not seen this operation do harm in any case.

In the after-treatment I have enjoined undisturbed rest as far as practicable.

The cases of the present series, like those of the former, were not selected in any way. They comprised all the patients presenting themselves to me for the cure of cataract, in whom I considered the method of extraction indicated, from May 19, 1881, until Nov. 8, 1882. As the results were better than those I have obtained in any previous series, and as I desire the reader to draw his own conclusions concerning the value of the different methods of operation and treatment, I will give, in a tabular arrangement, a synopsis of all the cases, so far as I have been able to follow them up. I add the names and addresses of the patients for I desire to state that I shall be thankful to those of my brother physicians who may be able and will be kind enough to complete my notes by any information on the later condition of any patient, particularly if it should not favorably compare with the statement made in the table. I request this favor not from fear that my veracity may be doubted, but because the value of medical statistics is in a certain degree lowered by the fact that the after-treatment, especially when the patient lives at some distance from the operator, is carried on by other physicians.

I. THE VISUAL RESULTS,
noted when the patients were examined for the last time,
were as follows:

V	$\frac{20}{20}$	in 7 cases	V	$\frac{20}{200}$	in 1 case
"	$\frac{20}{30}$	" 10 "	"	$\frac{5}{200}$	" 2 cases
"	$\frac{20}{40}$	" 16 "	"	$\frac{6}{200}$	" 1 case
"	$\frac{20}{50}$	" 15 "	"	$\frac{10}{200}$	" 1 "
"	$\frac{20}{70}$	" 22 "	"	$\frac{12}{200}$	" 1 "
"	$\frac{20}{100}$	" 9 "	"	$\frac{15}{200}$	" 2 cases
"	$\frac{20}{200}$	" 12 "			
<hr/>			<hr/>		
V	$\frac{20}{200}$	— $\frac{20}{100}$ in 90 cases.	V	$\frac{20}{200}$ — $\frac{15}{200}$	in 8 cases.
			V	$\frac{1}{20}$	in 2 cases.

Following the conventional designation, we have to record
in the present series of 100 cases:

90% of good results,
8% of moderate results, and
2% of failure.

No.	Name and Address.	Age.	General Health.	Condition of Eye and Cataract.	Date of Operation.	Operation.
1	M. Flick, Rondout, N. Y.	49	Good.	C. semimollis.	Apr. 19, 1881.	Large peripheric linear section.
2	Richard Wall, Brooklyn, N. Y.	70	Good.	Hypermature.	May 19, 1881.	Peripheric linear, small section; expulsion difficult; cornea collapsed.
3	Sarah Ryan, 424 5th Avenue, N. Y.	62	Good.	Dur. mat.	June 6, 1881.	Peripheric linear.
4	Mary O'Brien, New York.	70	Good.	Hypermature.	June 8, 1881.	Large peripheric section; zonula frail; <i>escape of vitreous</i> . Lens expelled by pressure with lids.
5	Samuel Herzog, 123 E. 84th Street, N. Y.	72	Debilitated.	E. very prominent. Cortex partially transparent.	Oct. 12, 1881.	Peripheric linear; <i>antisepsis</i> .
6	Mrs. Dwyer, Far Rockaway, N. Y.	60	Good.	C. semimollis.	Oct. 12, 1881.	Peripheric linear.
7	Malachi Kenney, Jersey City Heights.	58	Patient addicted to drink.	Semimollis.	Oct. 12, 1881.	Section angular; knife dull.
8	Mr. Waldmeyer, Jersey City Heights.	68	Good.	Semimollis.	Oct. 13, 1881.	Low flap along transparent corneal margin; edges in limbus; <i>antisepsis</i> .
9	Frank Hausheer, 186 Park Ave., Hoboken, N. J.	69	Feeble.	Dur. mat.	Oct. 14, 1881.	Low flap.
10	Mrs. M. Ayres, 20 W. 11th Street, N. Y.	64	Feeble.	Hypermature; centre of capsule thickened.	Oct. 18, 1881.	<i>Antisepsis</i> .
11	Aug. Schwetge, Williamsburg, N. Y.	59	Good.	Hypermature.	Oct. 22, 1881.	Low flap.
12	Mrs. Kinke, Philadelphia, Pa.	76	Good.	Dur. mat.	Oct. 22, 1881.	Low flap; <i>antisepsis</i> .
13	William Walker, Binghamton, N. Y.	69	Good.	Dur. mat.	Oct. 26, 1881.	Low flap.
14	J. A. Cowing, 7 Broadway, N. Y. City.	65	Good.	Dur. mat.	Oct. 26, 1881.	<i>Antisepsis</i> .

Course of Healing.	Length of Treatment.	Primary Vision.	Secondary Operation.	Length of Treatment.	Ultimate Vision.	Remarks.
Ruptured wound on seventh day. Hyphæma; well again in two days. Normal.	16	$\frac{10}{10}$	Discision a year later; no reaction.	5	$\frac{10}{10}$	—
Normal.	14	$\frac{10}{10}$	—	—	—	—
Wound closed in first night; no reaction. One fibriform adhesion.	17	$\frac{10}{10}$	Nov. 29, 1882. Division of capsule at her house; regular. Exposed to light the three first days. From the puncture in cornea a white streak to capsule; iritis for eight weeks, leaving one post. synechia, but a perfectly clear centre of the pupil. The white streak completely disappeared.	42	$\frac{10}{10}$	Six months after extraction, S $\frac{10}{10}$; eleven months later, $\frac{10}{10}$, from vertical wrinkling of capsule. The other eye, operated on by Dr. —, was shrunken by irido-cyclitis.
Normal.	14	$\frac{10}{10}$	—	—	$\frac{10}{10}$	—
—	20	$\frac{10}{10}$	Jan. 6. Discision.	4	$\frac{10}{10}$	—
—	19	$\frac{10}{10}$	—	—	$\frac{10}{10}$	—
Ruptured wound on seventh day; half ant-chamber filled with blood, followed by capsulitis plastica.	17	$\frac{10}{10}$	Dec. 15, 1881. Discision. Capsule not cut, but was detached from lower part of pupillary edge of iris and crowded above. Clear central pupil.	4	$\frac{10}{10}$	Six weeks after first discharge returned with thickened and striated capsule free from inflammation. S $\frac{10}{10}$.
No reaction.	16	$\frac{10}{10}$	Dec. 15, 1881. Discision.	3	$\frac{10}{10}$	—
On fifth day <i>spongy exudation</i> , slow in absorbing.	23	$\frac{10}{10}$	—	—	—	Patient mentally depressed, homesick; left before he was cured. The other eye operated at Institute before; success perfect.
Some lachrymation and congestion.	15	$\frac{10}{10}$	Dec. 3, 1881. Thickened capsule couched; no reaction. Pupil perfectly clear.	5	$\frac{10}{10}$	—
No reaction.	14	$\frac{10}{10}$	Dec. 12, 1881. Capsule divided with knife-needle; one dense band resisted; considerable stretching. Discharged, Dec. 29, 1881.	17	$\frac{10}{10}$	Returned Jan. 14th. Eye irritated. Healed slowly, but perfectly.
At the beginning of second week infiltration of outer corner of wound. Irido-capsulitis. Great pain. A small prolapse of iris in outer corner cut open and partially removed; forceps grasped it incompletely. Improved slowly; discharged with thickened capsule and partial adhesions.	34	$\frac{10}{10}$	Jan. 18, 1882. V— $\frac{10}{10}$. Division of capsule with knife-needle; no reaction.	5	$\frac{10}{10}$	A year later, vision excellent. Had no further discomfort.
No reaction.	15	$\frac{10}{10}$	—	—	$\frac{10}{10}$	—
On ninth day fell from his chair during a fainting spell; wound ruptured. A small whitish infiltration at outer corner ensued, but disappeared in a few days without specific treatment.	18	$\frac{10}{10}$	—	—	$\frac{10}{10}$	—

No.	Name and Address.	Age.	General Health.	Condition of Eye and Cataract.	Date of Operation.	Operation.
15	Mrs. Madden, 23 Elizabeth Street, N. Y. City.	62	Fat Woman.	C. dur. mat.	Oct. 28, 1881.	Low flap.
16	E. Hutton, Rondout, N. Y.	60	Good.	Semimollis.	Oct. 29, 1881.	Low flap; <i>antisepsis</i> .
17	Th. Kelly, 28 Elizabeth Street, N. Y. City.	58	Good.	Dur. mat.	Oct. 29, 1881.	Low flap.
18	Mr. Cotte, 100 1/2 W. 25th Street, N. Y. City.	59	Good.	Dur. mat.	Oct. 29, 1881.	Low flap; <i>antisepsis</i> .
19	L. Kilsinger, Paterson, N. J.	66	Good.	Dur. mat.	Nov. 8, 1881.	Low flap; <i>antisepsis</i> .
20	Van Zandt, Plainfield, N. Y.	76	Good.	Hypermaturation.	Nov. 11, 1881.	Linear section, apex 2 mm in cornea; <i>antisepsis</i> .
21	J. Beck, Little Falls, N. Y.	60	Good.	Dur. mat.	Nov. 11, 1881.	Section curved along fully one third of upper transparent corneal margin, (<i>Dr. Wecker's</i>). Iris cut with pincers-ciseaux.
22	Mrs. Vandenheufel, 106 E. 12th St., N. Y. C.	82	Decrepit.	Pupil closed. Cat. accreta, <i>complicata</i> ; old irido-choroiditis. Iridectomy four years previously. Other eye shrunken from irido-choroiditis.	Nov. 13, 1881.	Wecker's section; coloboma enlarged by excision of adjacent iris on both sides. Large peripheric opening of capsule. Exit of lens easy. <i>Antisepsis</i> .
23	M. McGowen, Boston, Mass.	58	Good.	C. hypermaturation, with thickening of centre of capsule	Nov. 15, 1881.	Wecker's section, with conjunctival flap.
24	Jac. Keller, Tom's River, N. J.	58	Good.	Dur. mat.	Nov. 17, 1881.	Wecker's section; no conjunctival flap; <i>antisepsis</i> .
25	Hannah E. Newkirk, 4 Vaness Pl., N. Y. C.	68	Good.	Pupil dilates insufficiently. Cat. Morgagnian.	Nov. 18, 1881.	Wecker's section. The iris was stroked out of the wound by spatula, so that a keyhole pupil was formed; yet, the cystotome, while passing through the upper edge of the capsule, caught hold of the stump of iris and dragged it along. The stump was excised. Remainder of op. normal.
26	Kate Daly, 256 W. 29th St., N. Y. C.	32	Good.	Semimollis.	Nov. 18, 1881.	Wecker's section. <i>Antisepsis</i> .
27	Fanny Reutlinger, 200 Ave. A, N. Y. City.	64	Good.	Hard; ant. chamber shallow.	Nov. 21, 1881.	Wecker's section, with conjunctival flap, which partially lay in gaping wound, and had to be stroked out with bent probe. Patient very restless, pressing and incessantly moving her eye. Operation tedious, but without accident: expulsion complete.
28	Katie Baldwin, 303 Fifth Ave., N. Y. C.	55	Good.	Semimollis.	Nov. 22, 1881.	Wecker's section, with conjunctival flap; <i>antisepsis</i> .
29	C. Hertlein, Carlstadt, N. J.	64	Good.	Dur. mat.	Nov. 30, 1881.	Wecker's section, with conjunctival flap, a portion of which engaged in wound and was stroked out with probe; <i>antisepsis</i> .

Course of Healing.	Length of Treatment.	Primary Vision.	Secondary Operation.	Length of Treatment.	Ultimate Vision.	Remarks.
No reaction.	14	28	Discharged Dec. 20, 1881.	4	28	Other eye operated on by me 18 months previously. Lost by chronic iridocyclitis. V = 1.
No reaction.	14	20	—	—	—	—
Wound closed slowly ; in its centre a small piece of lens substance.	20	20	Dec. 13, 1881. Capsule adherent to scar, dotted and thickened ; iris free. Discision produces large, central, perfectly clear pupil.	5	28	—
On sixth day, while kissing his wife, violently struck eye. Intense pain. Ant. chamber full of blood, which was absorbed in two days.	20	28	—	—	28	Some floating opacities in vitreous.
No reaction.	13	20	Dec. 16, 1881. V 28. Discision.	5	28	—
Capsule in upper part thickened, in lower wrinkled.	15	28	Dec. 18, 1881. The whole capsule dislocated upward. Pupil central, beautifully clear.	4	28	—
No reaction.	14	28	—	—	—	—
No reaction.	20	20	Dec. 3, 1881. 1-shaped division of capsule.	5	20	Opacities of vitreous.
No reaction.	14	20	Dec. 12, 1881. Discision.	4	28	—
No reaction.	15	20	—	—	20	Some choroidal atrophy.
No reaction.	20	28	Jan. 9, 1882. Discision.	4	28	—
No reaction.	20	20	Dec. 9, 1881 (the twenty-first day). Discision.	4	28	—
No reaction, but healing slow.	30	20	—	—	—	—
No reaction.	14	28	—	—	—	—
No reaction.	18	28	—	—	—	Lost other eye by iridocyclit., after extraction made by me two years previously.

No.	Name and Address.	Age.	General Health.	Condition of Eye and Cataract.	Date of Operation.	Operation.
30	J. Nehrbas, 158 E. 85th St., N. Y.	47	Good.	Cataract complicated. Central corneal speck; floating opacities in vitreous.	Nov. 29, 1881.	Low flap.
31	Hugh Rooney, Poughkeepsie, N. Y.	48	Good.	Cataract. luxata traumat.	Dec. 10, 1881.	Low flap; <i>Escape of vitreous</i> ; no iridectomy; iris fallen back; <i>antisepsis</i> .
32	H. Ehrsam, Bridgeport, Conn.	43	Good.	Cataract Morgagnian. Centre of capsule thickened.	Dec. 11, 1881.	Low flap. Large amount of milky substance, exit of nucleus without pressure, followed by stream of tears.
33	Mrs. C. Wiedenmeyer, 538 9th Ave., N. Y.	51	Good.	Dur. mat. complicata; opacities of cornea; adherent leucoma.	Dec. 12, 1881.	By mistake the back of the knife was directed upward. When the counter-puncture was made and the point of the knife was 5 mm. beyond it, the knife was turned on its axis, and the section completed as usual. After the expulsion of the lens, iris protruded at both corners; the greater protrusion in one was cut off, the smaller in the other reduced by spatula. Application of wound perfect.
34	Maria Joyce, 14 Spring St., N. Y.	48	Good.	Semimollis.	Dec. 14, 1881.	Wecker's section. Large iridectomy. Capsule ripped open by curved knife-needle from centre of section toward both corners; <i>antisepsis</i> .
35	Mrs. C. Capen, Cornwall, N. Y.	61	Feeble.	Dur. mat.	Dec. 15, 1881.	Small section. T incision of capsule, first the vertical. The horizontal, with cystome, from both corners toward the centre.
36	J. Purger, 330 E. 21st St., N. Y.	73	Feeble.	Lens dislocated in ant. chamber; traumatic.	Dec. 20, 1881.	<i>Loss of vitreous</i> . Iris tilted back.
37	Mrs. S. Simonds, Detroit, Mich.	63	Obesity.	Dur. mat.	Dec. 30, 1881.	Wecker's section, T shaped cystotomy; <i>antisepsis</i> .
38	Jos. Coons, Wilkesbarre, Pa.	64	—	Dur. mat.	Dec. 30, 1881.	Wecker's section.

Course of Healing.	Length of Treatment.	Primary Vision.	Secondary Operation.	Length of Treatment.	Ultimate Vision.	Remarks.
No reaction.	13	⅓%	—	—	—	Other eye operated on in 1879. V = ⅔.
A prolapse of iris, which showed two days after the operation was removed. Plastic iritis. Closure of pupil.	24	⅓%	Iridectomy downward.	7	⅓%	—
Upper part of coloboma occupied by whitish substance. From the sixth to the fifteenth day irritation; muco-purulent secretion, upper lid and conjunctiva swollen. Wound clean, ant. chamb. clear. The eye and conjunctival sac are frequently washed out with tepid salt water.	18	⅓%	—	—	—	—
Striped keratitis, disappearing as usual. No reaction.	14	⅓%	—	—	⅓%	—
Circumcorneal injection. Three <i>filiform adhesions</i> : one at each sphincter edge, one below.	14	⅓%	—	—	⅓%	—
Attacks of syncope, to which she is subject. Iritic irritation; no adhesions.	20	⅓%	—	—	⅓%	—
Prolapse of iris on second day; cut on fourth day. Dense pupillary membrane.	25	⅓%	Iridectomy.	6	⅓%	—
A tongue-like white streak extended from the vicinity of the inner corner 4-5 mm. down. Iritic reaction. Capsule thickened; no synechiae.	34	⅓%	May 15, 1882. A vertical white streak from basis of coloboma to centre of free and movable pupil; wrinkles of capsule radiating from central streak. V ⅓%. Discision. Puncture in lower part of cornea; capsule split obliquely from above and in to below and out; then a second time from above and out to below and in, meeting the other at its lower part; then the lower end of the white cord was put before the edge of the scalpel-needle and cut through.	6	⅓%	—
No reaction.	19	⅓%	Three months later, Discision.	5	⅓%	—

No.	Name and Address.	Age.	General Health.	Condition of Eye and Cataract.	Date of Operation.	Operation.
39	Mr. Hodge, D.D.S., Binghamton, N. Y.	52	Very nervous.	Dur. mat.	Jan. 19, 1882.	Wecker's section. <i>Anti-sepsis</i> ; anesthesia. Remnants of cortex.
40	Mrs. A. Kalb, 257 Ave. C, N. Y. City.	57	Good.	Dur. mat.	Jan. 26, 1882.	Low flap. Ether. <i>Anti-sepsis</i> .
41	Mrs. A. Kalb, 257 Ave. C, N. Y. City.	57	Good.	Hypermaturation.	Jan. 26, 1882.	Peripheral linear, immediately after extraction of the other. <i>Antiseptis</i> .
42	Fr. Kaul, 150 E. Houston St., N. Y.	62	Good.	Dur. mat.	Jan. 26, 1882.	Peripheral linear.
43	Mrs. Marsh, New Brunswick, N. J.	66	Good.	Hypermaturation. Capsule opaque.	Feb. 21, 1882.	Moderately high flap. <i>Antiseptis</i> .
44	Mrs. C. Paul, Williamsburg, N. Y.	74	Feeble.	Dur. mat.	Feb. 24, 1882.	Low flap; <i>antiseptis</i> . Patient unruly; a considerable quantity of cortex wiped out with lids.
45	A. McGraw, 130 Norfolk St., N. Y.	50	Feeble.	Dur. mat.	Feb. 24, 1882.	Wecker's section. <i>Anti-sepsis</i> .
46	Mrs. Jarvis, Binghamton, N. Y.	55	Fair.	Cat. compli., immature. Excessive myopia.	Mar. 9, 1882.	Wecker's section.
47	Aug. Hipp, Williamsburg, N. Y.	31	Good.	Soft.	Mar. 9, 1882.	Small linear section in cornea.
48	Mrs. Engle, Carbonville, Pa.	56	Good.	Morgagnian.	Mar. 16, 1882.	Wecker's section. <i>Antiseptis</i> .
49	S. Rosenfeld, 1112 2d Ave., N. Y.	74	Moderate.	Dur. mat. Capsule dotted.	Mar. 20, 1882.	Wecker's section.
50	Miss C. C. Bonner, Belvedere, Allegheny Co., Pa.	70	Good.	Dur. mat. Cortex whitish, not entirely opaque.	Mar. 21, 1882.	Graefe's peripheral linear; apex in transparent margin, ends beyond. Expulsion of lens easy, but removal of cortex requiring <i>prolonged rubbing</i> with lids. Iris in inner corner stroked back; some conjunctiva pushed in, brought out with probe. The clearing of the pupil and adjustment of iris and conjunctiva done by oblique light.
51	A. Günther, 338 E. 6th St., N. Y. City.	60	Weak.	Cat. dur. with transparent parts of cortex.	Mch. 24, 1882.	Low flap; nucleus and cortex expelled as one mass by spoon pressing on lower edge of cornea.
52	E. Doran, Yonkers, N. Y.	50	Good.	Hypermat.; centre of capsule thickened.	March 28, 1882.	Wecker's sect. Thorough <i>antiseptis</i> .
53	J. Field, New Brighton, N. Y.	45	Good.	Cat. dura, fere mat.	March 28, 1882.	Wecker's section.
54	A. Mudge, Cornellville, N. Y.	59	Good.	Morgagn.	Apr. 5, 1882.	Wecker's section. <i>Antiseptis</i> .

Course of Healing.	Length of Treatment.	Primary Vision.	Secondary Operation.	Length of Treatment.	Ultimate Vision.	Remarks.
No reaction.	18	30%	Sept. 28, 1882. Discision.	5	30%	—
No reaction.	18	30%	—	—	—	—
No reaction.	18	30%	—	—	—	—
No reaction.	20	30%	—	—	—	—
No reaction.	21	30%	March 7, 1882. Horizontal division of capsule.	4	30%	—
Patient restless. Congestion of iris. No adhesion. Capsule wrinkled and cloudy.	19	30%	May 17, 1882. Discision.	4	30%	—
No reaction.	14	30%	—	—	30%	Two months later, capsule perfectly clear.
No reaction.	23	30%	March 26, 1882. Discision of opaque capsule. Pupil small, horizontally slit-shaped.	5	30%	Most extensive choroidal atrophy. Opacity of vitreous considerable. News received nine months later, states that vision has greatly improved, and patient can read comfortably.
No reaction.	18	30%	—	—	—	—
No reaction.	19	30%	April 3, 1882. Discision.	6	30%	—
No reaction.	15	30%	Oct. 26, 1882. Discision. Needle was entered twice to cut a band.	5	30%	—
Panophthalmitis, beginning with pain in first night; increased second day; iris at both corners of wound whitish, infiltrated; then centre of flap. Third day a remission. Pus covered iris; left pupil free. The fourth day vitreous protruding, streaked; then ordinary course of panophthalmitis.	27	1	—	—	—	I attribute the loss of this eye to <i>prolonged manipulation</i> . There was no antiseptics employed, but the eye carefully cleansed before and in good condition. I had no dispensary on that day, but operated after coming from my office.
No reaction.	19	30%	—	—	—	—
From fifth day capsulitis for six weeks; pain at night; swelling of edge of upper lid; marked circumcorneal injection; whitish discoloration of centre of corneal lip of section, disappearing in four days. Upper part of coloboma free, lower occupied by white puriform substance within capsule; synechiae at lower part of pupil. Counted fingers through upper part all the time. Capsulo-iritis.	46	30%	May 6, 1882. Discision of upper part of capsule.	5	30%	—
No reaction.	15	30%	Nov. 28, 1882. Discision.	4	30%	—
No reaction.	12	30%	—	—	—	—

No.	Name and Address.	Age.	General Health.	Condition of Eye and Cataract.	Date of Operation.	Operation.
55	J. Garvey, 442 Avenue C, N. Y.	60	Good.	Dur. mat.	Apr. 14, 1882.	Wecker's section.
56	L. Weeks, Patchogue, N. Y.	74	Good.	Hypermat. accret.	—	Wecker's section. <i>Antisepsis.</i>
57	M. Fick, Rondout, N. Y.	50	Good.	Semimollis.	Apr. 20, 1882.	Regular peripheric linear. Considerable bleeding.
58	J. Starrs, Anderson Co., Tenn.	60	Good.	Margagnian complicated.	Apr. 25, 1882.	Wecker's section with conjunctival flap. <i>Antisepsis.</i>
59	K. Bauer, 124 Allen St., N. Y.	50	Good.	Dur. mat.	Apr. 27, 1882.	Wecker's section.
60	A. Siffken, Brooklyn, N. Y.	40	Good.	Semimollis, complic., traumatica; partially shrunken from foreign body still in eye.	Apr. 27, 1882.	Wecker's section; expulsion somewhat difficult, followed by a drop of vitreous. <i>Antisepsis.</i>
61	J. Doyle, 248 Hudson St., N. Y.	38	Good.	Mollis traumat.	May 2, 1882.	Wecker's section.
62	L. Chiverton, 442 W. 31st St., N. Y.	60	Weak.	Dur. mat.	May 8, 1882.	Wecker's section. <i>Antisepsis.</i>
63	A. Bietz, Jeffersonville, N. Y.	60	Good.	Dur. mat.	May 9, 1882.	Wecker's section.
64	W. N. Townsend, 437 Gouverneur st., Newark, N. J.	48	Good.	Dur. mat.	May 23, 1882.	Wecker's section. <i>Antisepsis.</i>
65	K. Fleming, 232 W. 28th St., N. Y.	38	Good.	C. mollis.	June 1, 1882.	Wecker's section. <i>Antisepsis.</i>
66	D. A. Dieck, 358 W. 18th St., N. Y.	64	Good.	Morgagnian.	June 1, 1882.	Wecker's section.
67	R. Wall.	60	Feeble.	Dur., mat., complicated; pupil does not dilate with atropine. Synchysis. Conjunctivitis catarrh.	June 2, 1882.	Wecker's section. After cystotomy a bead of vitreous presented. Lens expelled by holding post. lip back with a spoon, and pressing lower part of cornea with another. On inspecting the eye 5 min. later, a drop of fluid vitreous escaped. <i>Antiseptic dressing.</i>
68	P. Kelly.	60	Good.	Dur. mat.	June 8, 1882.	<i>Escape of vitreous</i> with cataract by excessive pressure. Dressing with absorbent cotton.
69	D. Hodge, Binghamton, N. Y.	55	Nervous.	Dur. mat.	June 10, 1882.	Ether. Spray. Carbolyzed dressing.
70	D. Callahan, 122 Madison St., N. Y.	60	Good.	Morgagn. complicated. Iris atrophic.	June 10, 1882.	Patient being unruly, a small piece of iris in corner of wound not removed. Thorough <i>antisepsis.</i>
71	Dr. E. Hall, 17 E. 66th St., N. Y.	62	Good.	Morgagn. cholesterinic.	June 12, 1882.	Wecker's section.
72	Mrs. J. Hughes, Tompkinsville, N. Y.	62	Good.	Dur. mat.	June 20, 1882.	Wecker's section.
73	Mrs. A. Feldhusen, 155 Seventh Ave., N. Y.	68	Good.	Dur. mat.	June 22, 1882.	Wecker's section. <i>Antisepsis.</i>
74	J. Bretz, 284 Second St., N. Y.	57	Good.	Dur. mat.	June 22, 1882.	Wecker's section. Expulsion of lens laborious.
75	Mrs. M. Thiele, 405 Ninth Ave., N. Y.	44	Good.	Dur. mat. (Complicated.)	June 27, 1882.	Wecker's section. Lens pressed out with fingers and lid, after removal of speculum.
76	M. Doyle.	41	Nervous.	Hypermat. complicated. (iridodonesis.)	Aug. 15, 1882.	Wecker's section. Iridectomy difficult on account of excitability of patient. Speculum removed. Lens squeezed out in capsule with fingers and lids.

Course of Healing.	Length of Treatment.	Primary Vision.	Secondary Operation.	Length of Treatment.	Ultimate Vision.	Remarks.
No reaction.	15	$\frac{20}{100}$	—	—	—	—
No reaction.	14	$\frac{20}{100}$	—	—	—	—
No reaction.	15	$\frac{20}{100}$	—	—	—	—
No reaction.	14	$\frac{20}{100}$	—	—	—	—
No reaction.	16	$\frac{20}{100}$	—	—	—	—
No reaction.	25	$\frac{20}{100}$	—	—	$\frac{20}{100}$	Six years ago a small piece of steel entered the eye, causing the cataract. No irritation. Eight weeks after extr. numerous retinal hemorrhages occurred; disappeared, leaving the eye quiet and good. Foreign body not discovered.
No reaction.	20	$\frac{20}{100}$	—	—	—	—
No reaction. Slow closure of wound.	31	$\frac{20}{100}$	—	—	—	—
No reaction.	15	$\frac{20}{100}$	—	—	—	—
No reaction.	14	$\frac{20}{100}$	June 16, 1882. Discision.	4	$\frac{20}{100}$	—
No reaction.	14	$\frac{20}{100}$	—	—	—	—
No reaction.	14	$\frac{20}{100}$	—	—	—	—
Circumcorneal injection moderate. No adhesions.	19	$\frac{20}{100}$	June 21, 1882. Discision. Needle entered twice to cut a resisting band.	5	$\frac{20}{100}$	Eye treated for a few days with a one to two per cent. solution of carbolic acid.
No reaction.	18	$\frac{20}{100}$	—	—	$\frac{20}{100}$	—
No reaction.	18	$\frac{20}{100}$	June 28, 1882. Discis.	5	$\frac{20}{100}$	—
Pain; lachrymation; protrusion of iris raising the flap. Closure of pupil by irido-cyclitis.	30	$\frac{1}{100}$ or $\frac{10}{100}$	—	—	$\frac{1}{100}$	Patient, whose other eye had been operated on a year before, was careless and uncontrollable, thinking all precautions superfluous.
No reaction.	15	$\frac{20}{100}$	—	—	$\frac{20}{100}$	—
No reaction.	21	$\frac{20}{100}$	Sept. 19, 1882. Discis. crucial.	5	$\frac{20}{100}$ at dis.	Pupil clear. Vitreous hazy.
No reaction.	16	$\frac{20}{100}$	—	—	$\frac{20}{100}$	—
No reaction.	14	$\frac{20}{100}$	—	—	$\frac{20}{100}$	—
No reaction.	18	$\frac{20}{100}$	Aug. 22, 1882. Discision.	5	$\frac{20}{100}$	Floating opacities of vitreous.
No reaction.	20	$\frac{20}{100}$	—	—	$\frac{20}{100}$	Floating opacities of vitreous.

No.	Name and Address.	Age.	General Health.	Condition of Eye and Cataract.	Date of Operation.	Operation.
77	Mrs. W. Ellrich, Plainsville, Conn.	61	Fair.	Dur. mat.	Aug. 19 1882.	Wecker's section. Patient restless, pressing. After cystotomy, speculum removed. Lens pressed out with fingers.
78	Mrs. L. Albinus, 618 E. 9th St., N. Y.	60	Good.	Morgagnian, complicated, subluxated.	Aug. 22, 1882.	After section lens proved dislocated downward. Vitreous presented; iris tilted back. Speculum removed. Lens in capsule pressed out with fingers. Slight loss of vitreous.
79	A. Spengler, 65 Forsyth St., N. Y.	64	Fair.	Hypermat. disciform; capsule thickened.	Aug. 23, 1882.	Wecker's section. <i>Anti-sepsis.</i>
80	J. Bassy, 306 Varick St., N. Y.	72	Feeble.	Hypermat.; ant. capsule thickened, and whole cortex pervaded with many chalky-looking dots.	Aug. 23, 1882.	Wecker's section. Broad iridectomy. Speculum removed. Lens squeezed out in capsule with considerable loss of vitreous.
81	Mrs. Mauer, 1058 Third Ave., N. Y.	67	Good.	Dur. mat.	Aug. 24, 1882.	Wecker's section.
82	John Ames, 525 W. 49th St., N. Y.	78	Debilitated. Stricture of urethra. Hematuria.	Dur. mat.	Sep. 13, 1882.	Wecker's section. <i>Anti-sepsis.</i>
83	Mrs. Dunn, Stockholm, N. J.	25	Weak. A great quantity of sugar in urine.	Diabetic.	Sep. 15, 1882.	Wecker's section. <i>Anti-sepsis.</i>
84	Miss K. Daly, 526 W. 29th St., N. Y.	33	Good.	Dur. mat.	Oct. 5, 1882.	Wecker's section.
85	Mrs. D. Schuhmacher, Hurleyville, N. Y.	66	Fair.	Hypermat., complicated.	Oct. 5, 1882.	Wecker's section. <i>Antis.</i> Cortex left.
86	A. Hilton, Andes, N. Y.	73	Good.	Dur. mat.	Oct. 5, 1882.	Wecker's section.
87	J. Field, New Brighton, N. Y.	45	Good.	Dur. mat.	Oct. 7, 1882.	Wecker's section.
88	L. Rosenstock, 191 First Ave., N. Y.	67	Good.	Dur. mat. Mac. corneæ old, from trachoma.	Oct. 9, 1882.	Wecker's section.
89	J. F. Purdy, 20 Fifth Ave., N. Y.	70	Eczema, chronic, of face.	Dur. mat.	Oct. 9, 1882.	Wecker's section. <i>Anti-sepsis.</i>
90	Mrs. M. Dodge, Garden City, N. Y.	62	Good.	Dur. mat.	Oct. 10, 1882.	Wecker's section. <i>Anti-sepsis.</i>
91	R. C. Burlage, 412 Pacific St., Brooklyn, N. Y.	74	Good.	Morgagn.	Oct. 11, 1882.	Wecker's section.
92	Miss Sheldon, Warren, N. Y.	66	Good.	Dur. mat.	Oct. 12, 1882.	Wecker's section.
93	A. C. Hawes, D. D. C., N. Y.	68	Good.	Dur. mat.	Oct. 12, 1882.	Wecker's section.
94	Mrs. Kane, 12 Washington Pl., N. Y.	64	Good.	Dur. mat.	Oct. 19, 1882.	Wecker's section. <i>Anti-sepsis.</i>

Course of Healing.	Length of Treatment.	Primary Vision.	Secondary Operation.	Length of Treatment.	Ultimate Vision.	Remarks.
No reaction.	14	38	Oct. 4, 1882. Discision.	5	38	—
Outer part of wound gaping by a small bead of vitreous. Closed. Pro-lapse of iris in outer corner.	21	38	—	—	38	—
No reaction.	20	38	Sept. 19, 1882. Discis. A clear central opening in thickened capsule.	5	38	—
No reaction for a week; then muco-purulent secretion; slight turbidity of ant. chamber; wound long open by intrusion of vitreous, finally closed regularly; no synechia. Treatment: careful cleansing; compressive bandage; atropine.	30	38	—	—	38	Considerable opacities of vitreous seen later.
No reaction.	19	38	—	—	38	—
Spongy exudation on fourth day, having contracted so as to fill pupil only, when he left. Had a severe attack of hematuria to which he was subject. Died four days after he had gone home.	7	Could not be tested accurately.	—	—	38	The eye being in a good condition, the operation would have given a good visual result.
No reaction.	12	38	—	—	—	Was well on 27th and to be discharged. Husband was prevented from taking her home. She had diabetic coma on the 28th, from which she died on the 29th.
No reaction.	14	38	—	—	—	—
No reaction.	16	38	Oct. 19, 1882. Discision. Central clear pupil.	5	38	—
Two filiform adhesions.	14	38	—	—	—	—
No reaction.	14	38	Nov. 26, 1882. Discision in both eyes.	5	38 in each.	—
No reaction.	14	38	—	—	38	—
No reaction.	12	38	Nov. 10, 1882. Discision. Slight reaction. A small string of mucoid vitreous projected from the stitch canal in cornea, after abscision of which all reaction disappeared; large, clear pupil.	5	38	—
No reaction.	14	38	Dec. 18, 1882. Discision.	4	38	—
No reaction.	14	38	Nov. 26, 1882. Discis.	4	38	—
No reaction.	15	38	—	—	38	—
No reaction.	15	38	—	—	38	—
No reaction.	14	38	—	—	—	—

No.	Name and Address.	Age.	General Health.	Condition of Eye and Cataract.	Date of Operation.	Operation.
95	J. Bubach, 182 Orchard St., N. Y.	54	Good.	Dur. fere mat.	Oct. 27, 1882.	Wecker's section. Cortex left.
96	Mrs. C. Guldenkirch, 188 Avenue B., N. Y.	50	Good.	Dur. mat.	Oct. 30, 1882.	Wecker's section.
97	Mrs. Small, Presby. Home, N. Y.	73	Feeble.	Hypermat.	Nov. 6, 1882.	Wecker's section. <i>Anti-sepsis.</i>
98	Mrs. Williams, 406 W. 20th St., N. Y.	60	Good.	Dur. mat.	Nov. 6, 1882.	Wecker's section. <i>Anti-sepsis.</i>
99	Mrs. A. McLevy, 655 W. 42d St., N. Y.	65	Good.	Dur. mat.	Nov. 7, 1882.	Wecker's section.
100	Mrs. B. Gurges, 2301 Second Ave., N. Y.	44	Good.	Dur. mat. complicata. Yellowish stellate nucleus.	Nov. 8, 1882.	After completion of section a large bead of vitreous presented. Speculum at once removed. Eye closed several minutes. Iridectomy. Lens squeezed out in capsule with fingers and lids; adhered at lower part; had to be scooped off with silver spoon. No escape of vitreous.

II.—THE AGE

of the patients, with the results of the operations, is shown by the following table.

Years.	Number of Operations.	RESULTS.		
		Good.	Moderate.	Failure.
25 . .	. . . 1 . .	. . . 1 . .		
30-39 . .	. . . 5 . .	. . . 5 . .		
40-49 . .	. . . 12 . .	. . . 10 . .	. . . 2	
50-59 . .	. . . 23 . .	. . . 21 . .	. . . 2	
60-69 . .	. . . 43 . .	. . . 40 . .	. . . 2 . .	. . . 1
70-79 . .	. . . 15 . .	. . . 12 . .	. . . 2 . .	. . . 1
80-89 . .	. . . 1 . .	. . . 1		
	100	90	8	2

Course of Healing.	Length of Treatment.	Primary Vision.	Secondary Operation.	Length of Treatment.	Ultimate Vision.	Remarks.
No reaction.	25	$\frac{1}{16}$	—	—	—	Discision will give full sight.
No reaction.	27	$\frac{7}{8}$	Jan. 12, 1883. Discis.	4	$\frac{3}{8}$	—
No reaction.	24	$\frac{3}{8}$	—	—	—	—
No reaction.	24	$\frac{1}{16}$	—	—	—	—
No reaction.	24	$\frac{1}{16}$	Dec. 18, 1882. Discision, perfectly smooth. No reaction.	5	$\frac{1}{16}$	About four days before she entered the hospital again, noticed that she saw things only half; did not mention it until several days after the second operation, when F. was found contracted on nasal side. OS. Retina detached outward and below. The detachment was probably of traumatic origin; the patient tells a different story, as often as she comes.
Considerable pain and flashes of light the first night. Afterward no reaction.	29	$\frac{1}{16}$	—	—	—	—

Referring to the synopsis of cases, we find that, below the age of forty-seven years, there was no failure and no half success. After that age the incomplete successes and failures increase in numbers as the years advance. Apart from any prejudicial influence of old age on the recovery from the operation, this cannot be otherwise in a series of unselected cases, for we may expect that an equal number of eyes between the age of sixty and eighty years will show a greater number of complications than between forty and sixty years, and will lower the rate of success proportionately.

III.—THE GENERAL HEALTH

of the patients showed its influence in several cases of this series, which deserve particular mention.

CASE No. 7 was a stout, plethoric man, addicted to drink. He was very restless, ruptured the well-closed wound on the seventh

day, which was followed by considerable hemorrhage in the anterior chamber, and obstruction of the pupil by capsulo-iritis. V $\frac{1}{10}$ was, however, by a subsequent successful discision of the capsule, raised to $\frac{3}{8}$.

CASE No. 9 was a feeble man of sixty-nine years of age. On the fifth day a spongy exudation filled the anterior chamber, was slow in absorbing, and still filled the pupil when, twenty-three days after the extraction, the patient left the hospital, counting fingers only near by. He was **mentally depressed and homesick**. As the other eye had been operated on a year previously, and was very good, he did not care much about the second eye, and, though asked by letter, has not been heard from since.

CASE No. 81 was a debilitated gentleman of seventy-eight years, who for years had suffered from the consequences of a urethral stricture. Of late severe spasmodic attacks of **hematuria** had occurred repeatedly, but always were over in a few days. He was operated on in Sept., 1882, feeling quite well. The wound closed in the first night, and the recovery progressed undisturbedly until the fourth day when spongy exudation was noticed in the anterior chamber. It caused no pain and only slight circumcorneal injection; the absorption soon began and advanced regularly. In the night of the eighth day he had a new attack of hematuria, more severe than any he had had previously, and gave him such excruciating pain that he wished to consult his family physician, and, if possible, to be treated in his own house in the city. As the eye was in a good condition, I could have no objection to his removal, which accordingly was done in the evening of the eighth day. He died four days later. When he left the Institute the exudation still filled the pupil, but the anterior chamber had become clear, the iris was bright, and his vision, though it could not be tested with any degree of accuracy, was put down as $\frac{1}{10}$, but would, undoubtedly, have become quite good after the absorption of the rest of the fibrinous exudation.

CASE No. 82 referred to a married woman of twenty-five years of age, who was very much reduced by **diabetes mellitus**. She had become so blind that she had only quantitative perception of light in each eye. Though her urine contained a large quantity of albumen, I extracted the cataract from one eye. The recovery was perfectly smooth, and on the eleventh day her husband was sent for to take her home, the eye being white and free from reaction, her sight good, $\frac{3}{8}$. Her husband, a workingman

in New Jersey, was very busy and did not come. On the thirteenth day she felt languid, in the night she became somnolent, and died of **diabetic coma**, in the hospital, on the fourteenth day.

These cases show that the healing process after the present method of extraction is not materially influenced even by very unfavorable conditions of the patient's general health.

IV—THE CHARACTER OF THE CATARACT

with its influence on the operation, the course of healing, and the visual result, is seen in the following table :

Character of Cataract.	Number of Operations.	Operation.		Recovery.		Visual Result.		
		Smooth.	With Accidents.	Kind.	Disturbed.	Good.	Moderate.	Failure.
Mature	58	56	2	47	11	55	3	
Immature	5	5		4	1	3	1	1
Hyper mature	20	18	2	18	2	20		
Complicated	17	11	6	14	3	12	4	1
Total	100	90	10	83	17	90	8	2

a.—Mature cataracts.

The two accidents which occurred in the 58 operations made for mature cataract, were :

1. *A small piece of lens left in the centre of the wound.* It may have been so transparent as to escape detection during the operation, or it may have lodged itself there later, when, by a casual opening of the wound, the aqueous escaped, carrying with it particles situated in the anterior chamber. It produced, in this case, a slow closure of the wound, but no irritation.

2. *Escape of vitreous* immediately after the expulsion of the lens. The cause was excessive pressure on the part of

the patient. This is the only case in the whole series where prolapse of vitreous occurred as an accident which might have been prevented, either by removing the speculum during the last act of the operation, and expelling the lens by outward pressure with the lid or spoon, or by anæsthetizing the patient. As the operation was otherwise smooth, it had no bad influence on the recovery.

Among the **reactive processes** the following are noted :

1. Two cases of *hyphæma*.
2. *Reopening of wound* in one case.
3. *Slow closure of wound* in one case.
4. *Traumatic infiltration of wound* in one case (No. 14).
5. *Spongy exudation* in two cases (Nos. 9 and 82).
6. *Filiform adhesions* in one case.
7. *Partial kerato-iritis* in one case (No. 37).
8. *Irido-capsulitis* in one case (No. 12), either from primary or secondary incarceration of iris in one corner of the wound.
9. *Detachment of the retina* in one case (No. 99). As the healing both of the primary and secondary operation was undisturbed, it is possible that the detachment was present or imminent before.

The *visual result* in all these cases was good, except in the two of spongy iritis, which left the institution before the absorption was complete.

b.—Immature cataracts.

I have been less afraid of operating on cataracts not perfectly ripe than I was formerly, because the remnants of lens, when the capsule is opened only at the periphery, are shut off from the anterior chamber and remain harmless in the capsular bag. They may give an insufficient primary visual result, as in case 95 of this series, but the ultimate result is good either by their spontaneous absorption or subsequent central division of the capsule. In one case (No. 50), where the immediate visual result was insufficient, I was led to clear the pupillary area by prolonged rubbing with the lids. I succeeded in clearing the pupil, but primary suppuration—the only instance of the whole series—destroyed the eye.

In spite of what I said above, I still adhere to the rule that immature cataracts should be removed only on forcible reasons of opportunity.

c.—Hyperature cataracts.

As in the preceding series, so in this, have the hyperature cataracts yielded the best results; the vision, in all of them, becoming good.

The accidents which occurred in two cases were limited *prolapse of vitreous*. In both, the zonula was frail and the lens was pressed out with the lids—in the first after opening the capsule, in the second together with the unbroken capsule. No reaction in either.

Two cases showed irritative reactive processes. In one (No. 32), a whitish exudation made its appearance in the upper part of the wound, accompanied by chemosis, swelling of the upper lid, and considerable muco-purulent discharge. The eye recovered under no other treatment than careful washing with lukewarm salt water.

In the other case (No. 52), the centre of the capsule was white and thickened. It occupied the natural pupil; on the fifth day irritation set in:—pain, circumcorneal injection, a whitish-yellow substance enclosed in the capsule at the lower part of the pupil, the upper part remaining black; synechiæ to capsule at lower part, in short—*purulent capsulitis* which lasted six weeks. At the beginning of this process the centre of the corneal lip of the wound became somewhat whitish, but cleared up completely in four days. The eye was carefully watched and cleansed; the capsule was wrinkled in the upper part, obstructed in the lower by a dense white substance. V $\frac{4}{10}$ was raised by a subsequent discision to $\frac{20}{100}$.

d.—Complicated cataracts.

There were in this series, seventeen cases of manifestly complicated cataracts. The accidents encountered during the operation on them were:

1. Small *prolapse of iris* in a corner of the wound (case No. 70). The patient had an atrophic iris, Morgagnian

cataract, and was so unruly that I could not remove the small prolapse. Irido-cyclitis ensued with total closure of the pupil. S $\frac{1}{6}$ (entered as a failure).

2. *Escape of vitreous* in five cases. In two (Nos. 31 and 35) the lens was dislocated in the anterior chamber. In the third (No. 60) the cataract was shrunken, and had been produced by a foreign body, still in the eye. In the fourth (No. 67) the iris was atrophic, the pupil immovable. After the opening of the capsule a bead of vitreous presented; the speculum was removed, the lens expelled by pressure with the lids, followed by a drop of vitreous. In the fifth the lens was squeezed out with the lids in its capsule. The recovery in all these cases, except in the one with irido-cyclitis, was satisfactory, and the sight as good as the condition of the eye before the operation warranted.

V.—METHOD OF OPERATING.

The *section* in the first cases was a linear incision, the end-points about 1 *mm.* in the limbus, the apex in the transparent cornea, near the upper end of the vertical meridian. Gradually, however, I shifted into the circular-marginal section of de Wecker. The latter has the advantage over the former that its end-points are less near the insertion of the iris and opens more readily, which renders angular processes: bruising and incarceration, less frequent and less intense. My experience has shown me, against my expectation, that it heals equally well as the linear section.

The *iridectomy* was made smaller than formerly in cases of healthy, not thickened capsule, for experience has shown that a smaller opening in the capsule in such cases is easily enlarged by the lens during its exit, without causing unpleasant complications.

The *opening of the capsule* was peripheric in all cases: a clean incision with the needle-cystotome. In a few cases I added a longer vertical incision, but soon gave it up, finding that the vertical incision was sometimes followed by a linear thickening (scar) in the centre of the capsule, from which a system of small folds radiated in every direction through the remainder of the capsule. It did not obviate an after-

operation, on the contrary made it more necessary and more difficult. The addition of a short vertical incision to the horizontal, which I practised in the beginning, has not proved of especial value in any kind of cataract, so that I now confine myself to the horizontal incision, leaving all optical imperfections in the pupillary area to be dealt with by the after-operation. A sufficient corneal section, a clean iridectomy, an incision of the capsule along the corneal section, constitute this comparatively simple operative procedure, which admits of an easy expulsion of the lens. The expulsion was commonly effected in the usual manner by pressing with a spoon on the lower segment of the cornea. In irritable patients and complicated cataracts I removed the speculum, and pressed the lens out with the lid or the spoon. This latter procedure was resorted to, and always successfully, in those cases of hypermature and complicated cataracts, in which I wanted to remove the lens within the unopened capsule.

Particular care was taken to have the **wound perfectly free from foreign substances**: conjunctiva, iris, capsule, lens. Whenever there was any suspicion of such substances lying in the wound, the eye was examined by oblique illumination, and the necessary measures taken. I may here say that for many years I have had artificial light ready at every cataract-operation. When the day was dark, or I was kept too long in the dispensary, I made the whole extraction by artificial light. I perform all cataract-extractions in the rooms of the patients, and a drop-light with an Argand gas-burner and a large hand-lens are always ready. Frequently I concentrate with the hand-lens the daylight on the eye. I mention these particulars with reference to Dr. De Wecker's recent recommendation to perform the last steps of extraction under all circumstances by artificial light. This I have not found necessary. An indispensable condition of performing a cataract-extraction correctly, is to see well, but this is the case in good daylight which, if present, is not only sufficient, but also very convenient in performing extraction. The necessity of a special lamp, as Wecker recommends, has not shown itself to me, for I had always

skilled assistants at my disposal, who threw the cone of light exactly where I wanted it. The most delicate manœuvre of the whole operation is the division of the capsule, which should not be made without good illumination by day or lamp light. The secondary division of the capsule I never attempt to do without artificial oblique illumination. These are the same rules which I made known as early as 1868,¹ and have observed ever since.

The cleansing of the wound is, as everybody knows, of the utmost importance; yet too much may be done in that line. I have in this whole series of operations avoided as much as possible passing probes or spatulas through or even into the wound, as rubbing with the lids commonly fulfils that purpose well enough, reducing even portions of iris which may have engaged in the corners of the wound. If rubbing and gentle pressure on the cornea failed to reduce the iris, it was either seized with forceps and cut off, or reduced with a blunt spatula or probe.

In every case I have endeavored to use all precautions to obtain primary union. In about half of them I have used antiseptic procedures. A spray of a 3-per-cent. to 5-per-cent. solution of carbolic acid was employed in the corresponding part of the room several minutes before the operation in order to purify the atmosphere. During the operation spray was never thrown on the patient's face, but on his body and on that of the operator and assistants, whose hands had been washed with a 3-per-cent. solution of carbolic acid. The patient's face and his hair near the eye were washed with a 2-per-cent. solution of carbolic acid, the eyelids and brow very carefully. The conjunctival sac was washed out with solutions of boracic acid, chloride of sodium, or some other salt in a weak solution, one quarter hour or longer before the operation. Immediately before operating I never put any thing in the conjunctival sac, so as to avoid all congestion from that cause. In a few of the operations, the instruments were placed in a 2-per-cent. solution of carbolic acid, but I relinquished that precaution very soon, as it

¹ *Graefe's Archives*, vol. xiv, 1, pp. 262-266. The advantage of artificial illumination in operations for secondary cataracts and other operations.

dulled the edge of the knife. Immediately before every operation were the instruments carefully cleansed with pure or very slightly saline water, and wiped (polished) with a clean, soft linen towel, and before use I inspected them, especially the teeth of the iris forceps, with a hand-magnifier. For wiping during and after operation fine and scrupulously cleaned sponges were used, which were selected from a large assortment, laid aside as operating sponges, and never employed for any other purpose. In the cases operated on with antiseptic precautions, the sponges were previously laid in a 3-per-cent. to 5-per-cent. solution of carbolic acid, but washed out in pure or boracic-acid water before wiping with them the wound or the conjunctiva. After the operation the eye was carefully cleansed with pure or boracic-acid water, the closed lids were covered with a thin layer of clean absorbent or borated cotton, over which a layer of cotton, moistened with a 2-per-cent. solution of carbolic acid was placed, and over that another thicker layer of absorbent or borated cotton, so as to pad the eye evenly, the whole held in position by an elastic flannel roller.

The padding in all cases was done with great care, in order to secure immobility of the eye and the wound as much as possible. The patient was admonished to lie in bed as quiet as possible during the first night, and to avoid, also, during the next day, every disturbance by conversation and the like. The bandage was changed as soon as the patient felt uncomfortable, which was usually not before the third day. If then there was no secretion, no swelling of the lid, and no pain, the outside of the lid was gently washed with a fine sponge without opening the eye, and the dressing renewed in the manner in which it was first applied. On the fourth or fifth day the eye was opened and cautiously inspected, but the wound exposed only when irritation was present. Atropine was always instilled before the operation, but generally not before the fifth or sixth day after it. Anæsthesia was only exceptionally required. In nervous and uncontrollable patients it is, I think, of decided advantage, and should not be withheld, as it secures a correct execution of the operation, which otherwise might not be obtained. Ether is

the only anæsthetic which I have used in all operations for eight years, giving it on the so-called choking plan. The average time of producing complete anæsthesia, as computed from several hundred narcotizations noted for that purpose, was one minute and thirty-seven seconds. This, the primary narcosis, can be kept up as long as we wish. The unpleasant after-effects from ether are no worse than those from chloroform, and scarcely ever have I seen, in my own experience, alarming symptoms which made it advisable to discontinue the narcosis, whereas, so long as I used chloroform they were not infrequent. After the sixth day the non-operated eye was left open, and the patient allowed to sit up. For two weeks the operated eye was carefully watched and cleansed, and if the course was regular, the patient was discharged on the fifteenth day.

This being the general plan of the operation, it remains only to say that the operations performed without antiseptics were executed and treated exactly in the same manner, with the exception that the antiseptic **substances** and the spray were omitted. I will state that the in-door department of the N. Y. Ophthalmic and Aural Institute, in which the operations were performed, offers **sanitary conditions** which I have nowhere seen surpassed. The dispensary is in the basement floor, entirely shut off from the in-door department; the laundry is in an annexed building, and above it the laboratory, where most of the teaching is done. The hospital accommodates thirty patients, not in large wards, but in rooms, containing each from one to four beds. Ventilation and cleanliness are rigorously enjoined, and with the occasional exception of one or two rooms in the top floor, where usually the poorest patients are placed, no hospital smell of any kind can be detected. All deodorizers are proscribed. Whenever there is a focus of decomposition, I want to detect and remove it, not to cover and hide it by a deodorizing substance. As soon as a patient is discharged, his bed is taken apart and the whole room cleansed from top to bottom; all closets and pieces of furniture being left open for one or several days, so as to avoid all stagnation of air. Rooms occupied by several patients have to

undergo the same cleansing process every few weeks. When a cataract patient is admitted his room must be put in order at least six hours previously, so that the dust from bedding, carpets, and furniture has had time to settle before the operation is done. The wiping of windows, oil-cloth floors, wood and marble furniture is, of course, done with a damp cloth. The in-door department of the Institute, thus kept more on the plan of a private hotel than of a hospital, has now been in operation for fourteen years, and though by far the greater part of its inmates were operative cases, no hospital disease, pyæmia or septicæmia, has ever been noticed, and local erysipelas, which soon terminated favorably, has occurred in only three cases, in which the bones of the orbit, nose, and mastoid process were extensively implicated in the operation.

The success of a cataract-extraction requiring not only what modern surgeons term "aseptic healing," but primary union, only a partial, very limited, suppuration of the flap is compatible with a useful result. In consequence of that, oculists have long been educated to rules of cleanliness, accuracy, and precaution in operating on the most delicate organ into which a surgical knife can be thrust, and I dare say that, in addition to this training, the great advancement which general surgery has made by the adoption of antiseptic methods, has not been lost upon ophthalmic surgeons, not even on those who, like myself, have not been in haste to believe and proclaim that the spray, the carbolic acid washings, the alcohol and other baths of the instruments, the borated-cotton dressing, and the like, are of paramount importance in eye-operations. Though all oculists agree that without a correct performance of every step of the operation a maximum of success is not obtainable, it may still legitimately be questioned whether in spite of a correct operation external wound-poisons are not sometimes at work which could be rendered innocuous by antiseptic means.* To judge of this question not merely from the statements of others, nor from possibly biassed speculations of my own, I put it to the test of experience, and have, in alternating order, operated on half of the cases with antiseptics, on the other

half without. Experience thus far has shown no difference in the result of the two sets of operations. Though the only case (No. 50), which was lost by primary suppuration, was not treated antiseptically, the series of antiseptically-treated cases showed a greater rate of irritative reactive processes, leading in one case (No. 70) likewise to a failure. Moreover, the case of primary suppuration can be satisfactorily accounted for by an improper procedure in the operation, viz., prolonged rubbing to clear the pupil. The cataract was not perfectly mature, and probably complicated, portions of the lens having a whitish, chalky appearance. The series of observations is not long enough to demonstrate a fact positively, but I think **the method of parallel observations**, under conditions otherwise as equal as possible, **is the only correct way to decide on the value of a therapeutic procedure**. Whereas it is not justifiable, on the one side, to ignore a question which involves a great principle, and which, in other departments, has had the most beneficial application, the exclusive followers of a new remedy or a new method, on the other hand, lose the opportunity of observing recoveries by nature or by other methods. Let me cite as an example the fact that the severest wounds of the cornea and sclera heal, as a rule, without suppuration, if the eye is carefully bandaged, without any antiseptic substances, and the patient be kept quiet for several days. On the strength of this observation, which I make every week, I attach very little value to the constant reports of isolated cases in societies and journals, where, under similar conditions, the wound had been closed with an antiseptic catgut suture, or the one or the other antiseptic remedy had been applied, the patient, however, was, in other respects, kept in the same conditions as mine without antiseptics; yet the extremists say, "had we omitted to employ antiseptic precautions, this result would not have been obtained."

All surgeons will agree with me in the proposition that **antiseptics has nothing to do where there are no conditions of putrefaction**. A clean wound in the eye, made without bruising, offers no conditions of putrefaction, and with

rare exceptions—which also the antiseptic treatment cannot control—we see it heal by first intention. Infection of a simple wound from an ordinarily pure atmosphere is, as Lister himself states, very little to be dreaded. There is, however, a proper field for disinfectants, namely, the poisonous discharge from old dacryocystoblennorrhœa. This and other infectious secretions from the conjunctiva or the surroundings of the eye have to be carefully removed before an extraction is undertaken. Would any surgeon leave such foci of infection undestroyed, and trust in the virtue of antiseptic methods?

Why is it that in eye-surgery the advantages of antiseptics cannot be so unmistakably demonstrated as in general surgery, advantages which I am far from denying, though the operative results of Lawson Tait and others are unsurpassed by the strictest adherents to Listerism? The following remarks are offered as an explanation: The eyelids protect the eye from outside influences, and form such a natural cover that wounds of the eye and orbit may almost be considered as subcutaneous; moreover, the conjunctival fluid, the tears, may be regarded as a natural antiseptic, perhaps better suited to the eye than any other. Is it surprising that in well-performed operations on the eye and in the orbit, we see suppuration only exceptionally—in cataract extractions from 1-per-cent. to 3-per-cent.—if a good bandage and rest of the patient secure immobility of the lips of the wound.

I cannot here enter more deeply into the discussion of the question on inflammation in general, and suppuration in particular. I abstain also from comparing statistically the results obtained by either method in the present series of extractions until I shall have larger numbers to draw conclusions from. Should anybody, however, feel inclined to do so, he will find the data in the above tabular synopsis of the cases.

I desire to say a word about **absorbent cotton**, which I have used in the present series almost exclusively, discarding the picked linen which formerly was in general use. I think that absorbent cotton, on the whole, is a cleaner ma-

terial than charpie ; it absorbs liquids well enough though not pus, but its chief virtue lies in its elasticity which far surpasses that of charpie. It forms an excellent pad which, when held by a flannel roller, secures by even elastic pressure immobility of the lips of the wound better than any other dressing I know of.

The *incidents* of the operation and the abnormal *reactive processes* occurring during the course of healing need not be specially mentioned, since they have been spoken of at the consideration of the different kinds of cataract, and are described in detail in the synopsis of the cases. The present series of operations again showed a remarkable infrequency of irritation during the course of healing, and I think that by careful attention in the dealing with the capsule and iris, on the importance of which I have always dwelt, in concurrence with many others, the inflammatory processes can be further so much reduced that the operation of extraction will yield the same, or almost the same, rate of recovery as iridectomy.

It seems well worth while to search systematically **why extraction is not yet made with the same safety as iridectomy**. The instruments are the same, and as in iridectomy nobody thinks of disinfecting his instruments if they are only clean, we may fairly conclude that for cataract-extraction no more is requisite. The greater size of the extraction-wound has been alleged as one of the causes of failure, and yet the size in itself is not such as to seriously interfere with the nutrition of the parts concerned. The excision of the iris is alike in both operations. The initial steps are the same in the one as in the other. The danger, therefore must lie in the subsequent steps: the *opening of the capsule*, and the *expulsion of the lens*.

For many years I have watched with particular attention the reactive processes due to the laceration of the capsule. I will repeat them briefly :

1. Extensive laceration gives rise to reactive processes showing the clinical picture of a plastic, and sometimes even of a suppurative inflammation, which starts from the capsule and implicates the iris and ciliary body.
2. The remedy, excision of the anterior capsule, which for

ten years I have persistently tried in three hundred operations, has proved a failure: it gave eleven per cent. of loss. The cause of this unfavorable issue was, I presume, the large exposure of the inner surface of the rest of the capsule and its adherent parts to the influence of the aqueous humor; producing in many cases the union of the two leaves of the crystalloid, in others inflammatory irritation.

3. Shreds of capsule may remain folded or unfolded between the lips of the corneal wound, preventing its thorough closure and leading to different kinds and degrees of inflammation: adhesive, plastic, and suppurative keratitis and kerato-iritis.

I have described all these processes so minutely and repeatedly in my former reports, illustrating them by actual personal observations, that I dare not again return to them. They have thus far not received that attention on the part of operators which I confidently believe they deserve. Six years ago, one of my European friends, whose name justly is considered to be authority in the question of cataract-extraction, told me confidentially in Heidelberg, after I had at the Congress communicated my observations and views on the reactive processes of the capsule, that "he did not believe a word of all I had said on the inflammatory processes of the capsule." Yet so firmly was I convinced of the correctness of my observations that I was resolved to abandon my former practice of opening the capsule widely, or removing its anterior part. From that time I have acted on a directly opposite principle, viz.: to interfere with the capsule as little as possible; not to lacerate it any more, but to open it by a peripheral incision of such limited extent as was compatible with an easy exit of the lens. The results of my experience in this direction have been communicated from time to time in these ARCHIVES and some other periodicals. The present report is offered as additional material for the discussion of a subject in which bare facts weigh more heavily than the most plausible arguments. In the great majority of cases the incision-wound in the capsule was found closed at the first inspection of the eye, the capsule was evenly stretched across the pupillary area, and the eye in the condition we find it after iridectomy.

The peripheric opening of the capsule diminishes the incarceration of the capsule more than any other method, but does not completely exclude it. In the present series there are two or three cases of peripheric whitish exudation, in one distinctly tongue-like, which may have owed their origin to a **protrusion** of a part of the edge of the capsule through the corneal wound. Capsular **adhesions** to the corneal scar were not infrequently noticed, but produced no or only very little reaction. That incarceration of portions of capsule may have prejudicial effects and ought to be studiously avoided, cannot be doubted, but *De Wecker* went too far when, at the first meeting of the recently founded *Société Française d'Ophthalmologie*, he made the sweeping assertion: *La suppuration ne dépend ni de la plaie cornéenne, ni de l'iridectomie, mais bien de l'ouverture de la capsule.*¹ The opening of the capsule may certainly be considered as a cause of suppuration, but not as the only one, for A. and H. Pagenstecher, both skilled and careful operators, had their share of suppuration also after extraction of the lens with the unbroken capsule.

From the preceding remarks the following conclusions appear to be uncontrovertible: *The capsule is an element of danger in the extraction of cataract.* As long as the removal of the lens with the unopened capsule, according to its warmest advocate, H. Pagenstecher, is indicated only in one third of the cases, *we should adopt that method of opening the capsule which makes it least liable to become the starting-point of irritative reaction.* **That method is the peripheric incision.**

The disadvantage inherent to it, the depression of the acuteness of vision in many cases by obstruction of the centre of the pupil—disadvantage which caused the originator of the method, Gayet, to abandon it again—can be satisfactorily met by a subsequent central division, as we shall see hereafter.

The second and last step which makes extraction a more dangerous operation than iridectomy is the *expulsion of the lens*. The expulsion itself, without any of its secondary

¹ *Recueil d'ophthalmologie*, Feb., 1883, p. 111.

effects, is a prejudicial element by adding to the traumatism. It is a surgical axiom that the healing of a wound will, other things being equal, be so much the kinder as the handling of it is less. The opening of the capsule, the expulsion of the lens, and the removal of remnants of cortex are three acts which are added to the traumatism of an iridectomy, and as such, apart from every thing else, increase the danger.

They are, however, less to be dreaded for themselves than for the prejudicial consequences which they involve. It is the expulsion of the cataract and its remnants that crowds portions of iris and capsule outward, presses upon and bruises them as well as the edges of the corneal wound.

Small protruding portions of capsule and iris may cause plastic and suppurative inflammation without being bruised and without the interference of bacteria. I believe in the **mechanical origin of inflammation** as well as I believe in **septic poisoning of a wound**. If Uskoff (*Virchow's Archiv*, vol. lxxxvi, p. 150) produced no reaction by one or two subcutaneous injections of indifferent fluids, but inflammatory irritation and suppuration by repeated injections, done with all antiseptic precautions; if a foreign body, of which I have but recently observed an example, lies quietly in the iris for fifteen years, then during the sixteenth year causes transient attacks of congestion of the iris after manifest exposures, and at last surrounds itself with a collection of pus, as shown after its removal with the corresponding portion of the iris, the eye being otherwise intact: we cannot doubt the possibility of a formation of pus without the interference of microorganisms, and I need not adduce any other arguments. In my laboratory days I, as multitudes of others, have placed a fresh frog's cornea under the microscope, and in the course of an hour have seen the movable cells wander toward the margin of the specimen and there accumulate in a row. May not, in a higher degree, the same phenomenon occur in the living wounded cornea, say simply by a locomotion of the movable cells toward the place of least resistance? If the wound is not irritated, these elements will, as a kind of callus, cement its edges, as is not infrequently seen in

corneal sections after extraction. They, as formative elements, will constitute the white scar. The same scar is observed, clinically, in transparent membranes, which are divided within the eye, *e. g.* the white line in the capsule which remains as the indelible trace of a former division. Moreover, the same white line is noticed at the edges of the capsular opening after secondary, central division, and very beautifully at the edges of a retinal perforation in cases of foreign bodies situated and tolerated in the background of the eye. It only needs the accession of a prolonged irritation, such as may take place when, after a cataract-extraction, the patients move their eyes frequently, or press on them, and thus *repeatedly* open the wound, to produce an inordinate migration of movable cellular elements, together with abundant serous exudation. The formative elements will then no longer be in a condition to organize into connective tissue, but will crowd in the edges of the wound and become free—purulent infiltration and discharge. Accepting Cohnheim's theory, of suppuration being produced by the emigration of white blood cells from the capillaries, we can imagine that prolonged irritation in the cornea will cause the greatest emigration to occur near the terminal vascular loops at the corneal margin. This may account for the appearance of the so-called ring abscess as the initial stage of the total suppuration of the cornea.

Prolonged irritation of the corneal wound, leading to its repeated rupture, may be produced by pieces of iris, lens, or capsule, situated in the section and projecting beyond its external margin. These projections will, at every movement of the eye, rub against the lid, retarding or eventually preventing the final closure of the wound.

Thus much about the mechanical origin of suppuration ; now some words about **its parasitic or septic origin**. First, I will unhesitatingly put myself on record as not believing that ordinarily pure air—I mean the air in a healthy locality, not over-fraught with dust—will infect a clean wound of incision, but I believe that contused wounds may be detrimentally invaded by the microorganisms contained in the atmosphere. The bruised parts must mortify as far

as their nutrition is stopped. The dead parts may be cast off by the healthy—partial sloughing—after which healing of the wound under more or less intense inflammation will take place; or the dead parts, soon invaded by bacteria, will remain for some time in contact with the living, act as a powerful irritant, and produce suppuration in the adjacent tissue with its consequences—septic infection. The therapeutical problem is: first, to operate in such a way that no mortification by bruising occur; and secondly, where we can not avoid it, to take such measures as to prevent the putrefaction of the bruised parts—antiseptic treatment. While fully recognizing this principle, and determined to continue in my parallel observations of operations performed with and without antiseptic means, I will only repeat that I consider the correct execution of the operation of paramount, antiseptis of secondary, and disinfection of least, importance. The antiseptic methods which have hitherto been used in surgery are too well known to justify any remarks on them, only the recent procedure of De Wecker, I think, ought not to be left unmentioned. Wecker, who, with his proverbial versatility, two years ago thought the spray to be indispensable for obtaining first-class results, has now thrown the same overboard, and terminates the cautiously performed operation by stroking the wound (he makes a conjunctival flap) with a tortoise-shell probe dipped in a 2-per cent solution of carbolic acid.¹ He mentions that after having had six cases of phlegmon of the eye while he used the spray, he had, since he abandoned it, not a single phlegmon in 400 cases.² This is a brilliant result, and it looks as if he had presented us with a method which really controlled suppuration after cataract-extraction. Not doubting the correctness of his statement, I trust he will not find fault with us if we postpone our final judgment until a more detailed account of these 400 extractions has appeared. There may be other causes of failure than suppuration, of which the carbolic acid, painted over the wound in such

¹ *Annales d' ocul.* Nov.-Dec., 1882, pp. 218 and 219

² *Rec. d' opthal.*, l. c.

strength as really to act as an efficient antiseptic, is, perhaps, not innocent.

I come to the last part of this report,

VI.—THE AFTER-OPERATIONS.

In thirty-eight cases after-operations were made :

1. *Discision* with a knife-needle, as described in previous reports, in thirty-four cases. Two of them (Nos. 3 and 11) were followed by reaction and protracted recovery, but the final results were good. No case was injured by this after-operation—almost all were greatly benefited. The operation was frequently made as early as the third week. I find that the sooner after extraction it is performed, the easier the capsule is cut ; yet I always wait until the reaction from the extraction has subsided and the wound is consolidated.

2. *Dislocation of thickened centre of capsule* with the same needle in two cases. In some cases I have detached adhesions of the capsule with the iris, sweeping the knife-needle along the pupillary margin where the capsule was thinnest, and then have slightly dislocated the thickened part. This method refers to cataracta accreta.

3. *Iridectomy* in two cases ; in both of which the cataract had been traumatic and dislocated into the anterior chamber. Other cases of this series will doubtless come to have the capsule split later. The operation has, thus far, succeeded in all cases, and as it is the necessary completion of the primary operation in the majority of instances, I can say in its favor and in favor of the whole method, that it appears to be a harmless procedure, and that the vision obtained by it will not deteriorate afterward, as often occurs in most other methods of extraction where the centre of the capsule is primarily lacerated. The vision, after subsequent division of both capsules, generally becomes sharper months and years afterward, because the process of contraction and thickening of the periphery of the capsule will enlarge its central perforation.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY DURING THE SECOND
AND THIRD QUARTERS OF THE
YEAR 1882.*

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WITH THE COÖPERATION OF

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Lisbon ; HIRSCHMANN, Charkow ; S. M. BURNETT, Washington ; OLE
BULL and SCHIÖTZ, Christiania.

Translated by DR. F. E. D'OENCH, New York.

**B.—ANOMALIES OF REFRACTION AND ACCOM-
MODATION, LIDS, LACHRYMAL APPARATUS,
MUSCLES AND NERVES, ORBIT AND NEIGH-
BORING CAVITIES, CONJUNCTIVA, CORNEA,
AND SCLERA.**

BY DR. C. HORSTMANN.

I.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

1. SCHUBERT. The influence of the slanting system of penmanship upon the eyes of children. *Bay. Aerzt. Intelligenzblatt*, vol. xxix, No. 21, 1882.
2. BERLIN, R. The physiology of handwriting. *Arch. f. Ophth.*, vol. xxviii, 2, p. 259.
3. BERLIN, R. The hygienic advantages of the slanting system of penmanship. Rep. on the 14th meeting of the Ophth. Soc. at Heidelberg, 1882.

SCHUBERT (1) insists upon placing the book parallel to the table's edge and would exclude the inclined system of penmanship entirely from the schools, as

* Continued from page 516, vol. XI.

the difference in the distance of the two eyes from the point of fixation produce unequal accommodation, which may easily lead to the loss of binocular vision, and further on to difference in refraction and visual power, and finally to squint.

BERLIN (2 and 3) denies these conclusions. The act of writing is controlled by the eye, in particular by the laws which govern the movements of the eye. As the downward stroke is always perpendicular to the base line, it must cross the latter, when writing with letters inclining to the right, from the left side and above to the right side and below. The consequence is that when the book lies straight the child must sit inclined to the right, may sit straight when the book is placed obliquely, and when this position is exaggerated must sit inclined to the left. The inclined system of penmanship, when the book is placed obliquely, has this advantage over the vertical system, inasmuch as it requires much less muscular exertion, the vertical system calling all the muscles of the arm up to the shoulder into play.

1. SCHLEICH. Ophthalmoscopic examination of the eyes of 150 new-born children. *NAGEL's Commun. from the Ophth. Clinic at Tübingen*, vol. iii, p. 144.

2. ALBRECHT. Statistical contributions to the knowledge of myopia. *Klin. Monatsbl. f. Augenhk.*, vol. xx, p. 342.

3. TSCHERNING. *Studier over Myopiers Ætiologi*. Copenhagen, 1882.

4. BORTHEIN, LYDER. Tests of refraction and color-blindness of 550 children in three different schools. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 406.

5. Myopia in France. *Brit. Med. Journ.*, May, 1882, p. 755.

6. Short-sight a fashion. *Med. Times and Gazette*, April, 1882, p. 406.

7. COHN. The eyes of school-children. *EULENBURG's Real-Encyclop.*, vol. xii, p. 248.

SCHLEICH (1) found the eyes of the new-born to be hyperopic, the same as Königstein, Horstmann, and Ely.

According to the observations of ALBRECHT (2), the degree of refraction was the same in both eyes in 40% of 1,638 cases examined. In 50.6% of 940 cases the result of the examination of both eyes was the same with the ophthalmoscope as with glasses, in the remainder there was a difference. Out of 1,120 cases there were 417 with high degrees of myopia, *i. e.*, more than 6 D. 41 (10%) of these showed no traces of atrophy of the choroid, or sclerectasia. Cases were also observed in which an increase of the degree of myopia without convergence or accommodation could be demonstrated.

TSCHERNING (3) draws his conclusions from the observation of 9,567 persons. He distinguishes three kinds of myopia: 1. Myopia from unknown causes not due to close vision or diseases of the eye, perhaps to hereditary predisposition. This kind of myopia is either congenital or develops up to the age of twenty-five. The fundus is normal; there is either no conus or only a very narrow one. Vision is generally good. As a rule, only the lowest degrees of myopia belong to this category. 2. Myopia due to too near vision is most common among the educated classes. It is less than 9 D; on an average it about equals 4 D. Sometimes there is a congenital predisposition. The ana-

tomical changes are not yet sufficiently well known. It is rarely complicated with choroiditis, but the conus is common. 3. Excessive degrees of myopia (more than 9 D) are governed by another law in their distribution. They are found in all classes of society without regard to their occupation; they must be regarded as a genuine disease and are comparatively rare, scarcely in more than 1% of the population. This form of myopia is always due to an elongation of the globe, and is generally complicated with other diseases of the eye, especially of the choroid. It is probably a chronic form of choroiditis, with exudations into the vitreous. SCHIÖTZ.

1. WEISS Contributions to the anatomy of the myopic eye. *Commun. from the Ophth. Clinic at Tübingen*, vol. i, 3, p. 63.

2. CARL THEODOR, duke in Bavaria. Some anatomical conditions in myopia. *Commun. from the Royal Ophth. Clinic*, Munich, vol. i, 3, p. 233.

WEISS (1) examined two eyes with a low and two with a high degree of myopia. He found that the conus of myopia is not due to a thinning of the choroid at this point with deposit of pigment, but to an extensive traction of the broad folds of the optic nerve across the scleral margin by the choroid, which was entirely wanting over the conus. He also showed that the hyaloid and external limiting membrane of the retina must be strictly kept apart, according to the views of Schwalbe, and in opposition to those of Henle and Iwanoff. As regards the choroid over the staphyloma, it is found that the retina is attached in numerous little spots to the choroid, and this again to the sclera. As it approaches the optic nerve the choroid becomes thinner and thinner, and its attachment to the sclera firmer and firmer. At the optic nerve itself the adhesion is very firm. The small portion of the choroid corresponding to the staphyloma is totally devoid of pigment and contains a few medium-sized blood-vessels, partly filled with blood, partly obliterated.

Duke CARL THEODOR (2) also found that the cone so frequent in myopic eyes is due to a supratraction of the retina. He also found that the increased area of the blind spot, maintained by Nagel, may well be brought into accord with the anatomical conditions; for both upon the refraction and supratraction side the light-perceiving elements do not approach the optic nerve as close as is normally the case.

SCHROEDER. De l'essence de l'hypermetropie manifeste et de l'hypermetropie latente. *Arch. d'ophth.*, vol. ii, No. 4, 1882.

For the lower degrees of hypermetropia, up to 4 D, the ratio between the latent degree of hypermetropia and the breadth of accommodation is constant, the fraction of the whole breadth of accommodation represented by the latent degree of hypermetropia always remaining the same, no matter whether it be reduced by age or insufficiency of the ciliary muscle (atropine). If the power of accommodation (a) at the age of 10 — 14 D, the entire hypermetropia is latent, and the ratio of accommodation $= \frac{Ht}{14}$. As this ratio remains unchanged, when a diminishes $Hl = \frac{Ht \cdot a}{14}$, and as $Hm = Ht - Hl$, $Hm = \frac{Ht(14-a)}{14}$, Hl and Hm were calculated in a number of cases according to this formula, and were seen to agree with the values found, both when the accommodation was normal or had been paralyzed.

v. MITTELSTÄDT.

1. RÄHLMANN. The optical effect of hyperbolic lenses in keratoconus and irregular astigmatism. *Klin. Monatsbl. f. Augenhk.*, vol. xx, p. 111.

2. ANGELUCCI. Contribuzione all' applicazione delle lenti iperboliche. *Quadri statistici e frammenti di oftalmologia*, Roma, 1882.

RAHLMANN (1) publishes fourteen cases of keratoconus, whose vision was increased by the use of hyperbolic lenses. Vision increased considerably, the field of vision became clear, and objects were rendered more distinct.

ANGELUCCI (2) found $V = \frac{1}{2}$ in one eye, and $-\frac{1}{2}$ in the other, after correcting the keratoconus with hyperbolic glasses, while strong concave glasses increased V only to $\frac{1}{2}$ resp. $\frac{1}{4}$. In high degrees of myopia also hyperbolic lenses increase vision a little more than ordinary concave glasses, peripheric vision especially becomes more distinct. DANTONE.

1. HARLAN. Cases of unusually high degree of accommodation spasm, myopia simulated by hypermetropic eyes. *Med. News*, May 6, 1882.

2. GRIFFITH. Sudden paralysis of accommodation completely restored in a week. No specific cause. *Ophth. Rev.*, vol. i, May, 1882, p. 183.

3. VELARDI, E. Dell' astenopia accommodativa. *Boll. d' ocul.*, vol. iv, Nos. 9, 10, 11, 12.

4. MOOREN. *Five lustra of ophthalmological practice*, p. 274.

HARLAN (1) reports three cases of spasm of accommodation, in which myopia $\frac{1}{2}$ resp. $\frac{1}{4}$ was found before using atropine, but afterward hypermetropia $\frac{1}{8}$ resp. $\frac{1}{16}$ and $\frac{1}{16}$.

GRIFFITH (2) reports recovery from paralysis of accommodation in course of a week after the use of quinine and strychnine. FITZGERALD.

VELARDI (3) gives an elementary treatise on hypermetropia and accommodation. DANTONE.

MOOREN (4) mentions the rapid fatigue of the ciliary muscle after severe illness, in sensitive women and onanists. He saw sudden spasm of accommodation develop after injuries in the ciliary region, also in uterine diseases and long-continued close vision.

II.—LIDS AND SURROUNDINGS OF THE EYE.

1. KROLL. Contribution to the pathology and treatment of blepharitis simplex. *Berlin. klin. Wochenschr.*, No. 27, 1882.

2. TAMAMCHEF. Another contribution to the pathology and treatment of the affections of the margin of the tarsus, especially trichiasis and distichiasis. *Centralb. f. pract. Augenhk.*, p. 263, 1882.

3. BURCHARDT. Contribution to the treatment of trichiasis. *Charité-Ann.*, vol. vii, p. 633.

4. BLEICHER. Pediculi pubis in the lashes of children. *Wiener med. Wochenschr.*, No. 32, 1882.

5. LEVISTE. Blepharite ciliaire due à la présence de pediculi pubis dans les cils des paupières supérieures. *Jour. des connais. méd.*, No. 32, 1882.

6. ORTIZ, PEREZ. Tumor gomoso ulcerado des párpado superior tratado con la tintura de jodoformo. *Oftalm. prat.*, vol. i, No. 4, p. 80.

7. WIETHE. Cases of syphilitic affections of the lids. *Allg. Wiener med. Zeitung*, No. 23.
8. GALEZOWSKI. Chancre des paupières et du globe oculaire. *Rec. d'ophth.*, vol. iii, 10, p. 604.
9. STREATFEILD. Syphilitic chancre at the inner canthus. *Brit. Med. Jour.*, Sept. 30, 1882, p. 644.
10. DUBUJADOUS. L'étude de l'œdème malin des paupières. *Arch. génér. de méd.*, Oct. 1882.
11. RAEHLMANN. Amyloid degeneration of the lids. *Arch. f. Augenheilk.*, vol. xi, p. 402. These ARCHIVES xi, p. 466.
12. GERIN-ROZE. Blépharite chronique tuberculeuse. *Soc. méd. des hôp.*, Feb. 10. *L'union méd.*, No. 51, 1882.
13. GROS. Eléphantiasis des paupières et de la région temporale. *Rev. méd. de l'est*, Jan. 1, 1882.
14. HOCK. Ptosis. *Eulenberg's Real.-Encycl. des ges. Heilk.*, vol. xi, p. 167.

According to TAMACHEF (2), trichiasis and distichiasis are due to purulent inflammation of Meibom's and the tarsal glands and their surroundings. His treatment consists in making a longitudinal incision parallel to the orifices of the glands. The surface thus exposed is then touched with a sharp nitrate of silver stick. When the scab which then forms becomes detached, the hairs fall out with it.

BLEICHER (4) saw blepharitis in little children due to pediculi on the lashes.

LEVISTE (5) verified this observation with the microscope, after the usual treatment for blepharitis had failed, and thinks the disease more frequent than is generally assumed.

V. MITTELSTADT.

WIETHE (7) reports three rare cases of syphilitic affections of the lids: 1. Syphilitic primary sclerosis of the right lower lid. 2. An ulcerating papule of the left upper lid. 3. Gumma of the right lower lid.

STREATFEILD (9) saw an indurated syphilitic ulcer at the inner canthus. Cured by inunction.

According to RAEHLMANN (11) amyloid degeneration begins in the lymphoid cells of the subepithelial layer, while the supporting tissue at first remains intact.

GERIN-ROZE (12) saw on the right upper lid of a debilitated man who had suffered from hemorrhage at various times, several small and one larger ulcer, with sharp, swollen edges, which penetrated into the cartilage; he was inclined to consider them tuberculous.

V. MITTELSTADT.

1. HUME. Ectropium of both eyelids operated on by Wolf's method. *The Lancet*, vol. ii, No. 3, 1882.

2. SNELL. Case of ectropium successfully treated by transplantation of a large non-pedunculated flap from the arm. *The Lancet*, vol. ii, No. 3.

3. BENSON. Restoration of the eyelid by transportation of skin from distant parts of the body. *Med. Press*, Apr. 1882, p. 303. *Brit. Med. Jour.*, Apr. 29, 1882, p. 620.

All the authors mentioned report good results of transplantation of a flap without a pedicle, according to Wolf's method.

1. DRANSART. Guérison du ptosis par des procédés opératoires spéciaux. *Ann. d' ocul.*, vol. lxxxviii, p. 147.
2. WECKER. Une nouvelle opération du ptosis. *Ann. d' ocul.*, vol. lxxxviii, p. 29.
3. PANAS. D' une modification apportée au procédé dit de transplantation du sol ciliaire. *Arch. d' ophth.*, vol. ii, No. 3, p. 208.
4. WILLIAMS. On the treatment of entropium and trichiasis by a new operation. *Liverpool Medico-Chir. Jour.*, July, 1882, p. 319.
5. DIANOUX. De l' autoplastie palpébrale par le procédé de Gayet. *Ann. d' ocul.*, vol. lxxxviii, p. 132.
6. CARRE. Ectropion cicatriciel de la paupière intérieure. Operation avec greffe dermo-épidermique. *Gaz. d' ophth.*, No. 11, 1882.
7. BOLLIET. De la greffe cutanée et de ses applications principalement à la chirurgie oculaire. *Thèse de Paris*, 1882.
8. FIEUZAL. De l' ectropion. *Union méd.*, No. 16.
9. PANAS. Tarsoraphie. *Gaz. d' ophth.*, No. 6, 1882.
10. BUSINELLI. Sulla tarsoraphia preventiva. *Boll. dell' Acad. méd.*, vol. viii, No. 6 and *Boll. d' ocul.*, vol. v, No. 1, Sept. 1882.
11. PERGAMIN. Entropium-operation according to Squar's method. *Wratsch.* No. 26.
12. SZOKALSKI. Rare case of union between the upper lid and eyeball. *Medycyna*, No. 9, 1882.

DRANSART (1) claims priority over Pagenstecher in advising to transmit the raising of the lid to the frontal muscle in ptosis.

WECKER (2) describes a new method for ptosis, which consists in a combination of that of Pagenstecher and Gräfe. As in Gräfe's method an oval piece is cut out of the skin and orbicularis muscle of the upper lid, after which two sutures are applied, similar to Pagenstecher's method, one in the inner, the other in the outer part of the lids. The needle is introduced over the inner part of the eyebrow a finger's breadth above the orbital margin, passed downward under the skin and muscle, out again at the upper margin of the wound, under the edge of the excised orbicularis muscle, entered again under the edge of the orbicularis muscle of the lower margin of the wound, and passed along under the skin of the marginal part of the lid, and then back again, so that the points of entry and exit of the needle are above the eyebrow, about $\frac{1}{2}$ mm. apart. The two ends of the thread are then tied over a little roll of leather. In the same manner a thread is passed through the outer part of the eyebrow and lid. When the threads are tied the edges of the wound are brought in contact, and should heal by first intention. As soon as the threads have cut through the skin at the margin of the lid, they are removed.

MARCKWORT.

PANAS (3) modifies the method of Anagnostakis in transplanting the lashes, by detaching the flap of skin as far as the margin of the lid, leaving it only connected with the conjunctiva, then severing the orbicularis muscle and

pushing it upward. He then unites the flap with the ligamentum tarsi superius.
V. MITTELSTÄDT.

In operating for entropium and trichiasis, WILLIAMS (4) makes Burow's incision of the tarsus from the conjunctival side, passes sutures to the outer side, as in the operation of Anagnostakis and Snellen, and ties the thread on the external surface of the lid.
NETTLESHIP.

DIANOUX (5) operates for entropium as follows: He makes an incision parallel to the margin of the lid, four mm. from its edge, passes Guérin's double-edged knife into the margin of the lid behind the lashes, and thus divides it into an anterior and posterior plate. He forms a strip of skin containing the lashes, and another three mm. broad above the first incision, draws the upper strip under the lower, and fastens the former in the position of the latter.

MARCKWORT.

In cicatricial ectropium of the lower lid CARRÉ (6) cuts the cicatricial tissue, makes the lid movable, and freshens the edges of the lid. Flaps without a pedicle, which do not extend through the whole thickness of the lid, are then transplanted into the defect.
V. MITTELSTÄDT.

FIEUZAL (8) reports a case of cicatricial ectropium of the lids from combustion, in which he succeeded, after cutting the cicatricial bands, in transplanting two flaps, without a pedicle, of ten and six sq. cm. respectively.
V. MITTELSTÄDT.

In cases in which a partial tarsoraphy becomes necessary for lagophthalmus due to shrinkage of the lid, or ectropium, the palpebral fissure, according to PANAS (9), should not be opened until after a long time, and then only gradually at great intervals, in order to prevent a failure.
V. MITTELSTÄDT.

In a patient who had lost the skin of both lids with the exception of a narrow strip along the margin from a malignant pustule, BUSINELLI (10) made a preventive tarsoraphy at a time when the whole surface was still granulating, in order to prevent cicatricial contraction. He gained his object, as a month later the edges of the lids were still firmly united, while the ulcer was almost completely covered with new skin.
DANTONE.

In operating for entropium PERGAMIN (11) substitutes a serre-fine for the toothed forceps when applying the suture according to Squar.
HIRSCHMANN.

SZOKALSKI (12) saw the posterior edge of the upper lid united with the lower part of the conjunctiva of the globe by a membrane $\frac{1}{4}$ " broad, which covered the cornea. Cured by severing it with a pair of scissors.
HIRSCHMANN.

1. ABADIE. Traitement du blépharospasme par le massage forcé du muscle orbiculaire. *Gas. des hôp.*, Oct. 7, 1882.

2. PANAS. Blépharospasme hystérique traité par l'elongation du nerf sus-orbitaire. *Semaine méd.*, March 2, 1882.

3. MILLES. Spasmodic entropium of lower lid. *Roy. Ophth. Hosp. Rep.*, vol. x, p. 388.

4. DANESI. Un caso di logoftalmo da paralisi del faciale curato colla faradizzazione. *Bollet. d' ocul.*, vol. v, 1, p. 7.

After having put some vaseline on the lid, ABADIE (1) rubs the orbicularis

muscle with the thumb, from the centre of the eye toward the periphery. He cured two cases of blepharospasm in this manner; in the third the treatment failed.

PANAS (2) cures blepharospasm by stretching the infra-orbital nerve.

1. WEINLECHNER. The treatment of angiomata. *Wiener med. Blätter*, 1882, Nos. 38 and 39.

2. AGUILAR BLANCH. Melanosarcome de la paupière; exstirpation; guérison. *Rec. d'ophth.*, vol. iii, No. 10, p. 620.

3. COOMES. Round-cell sarcoma involving the eyelids and adjacent parts of the face. *St. Louis Med. News*, Jan. 28, 1882.

4. HUMBERT. Tumeur érectile de la paupière supérieure droite chez un enfant de 8 mois. *Rev. de théér.*, No. 12, 1882.

5. LUNDY. Remarks on important cases. *Rep. of the Mich. Eye and Ear Infirmary*.

6. CORNWELL. Dermoid cyst of the lid. *Med. Record*, Sept. 23, 1882.

WEINLECHNER (1) advises to spare the skin of the lid, especially the edge and cartilage, when extirpating an angioma. A plastic operation should not be attempted at once, unless the indications are imperative, but the natural course of healing should be allowed to proceed and an operation done later if necessary. It is especially difficult to remove the angiomata at the inner canthus. Here Weinlechner tampons the wound with styptic cotton, but does not unite the edges, in order that any remnants may be destroyed with lapis or the galvano-cautery from the wound.

HUMBERT (4) removed a tumor of the right upper lid of the size of an almond by injecting a dilute solution of the sesquichloride of iron, which only produces a coagulation of the blood, similar to that under normal circumstances.

V. MITTELSTADT.

LUNDY (5) removed a varicose tumor from a child by means of electrolysis. The tumor was situated at the root of the nose, and had involved both eyebrows and half of the left upper lid. A battery with 22 elements was used. The introduction of the needles was followed by considerable reaction. Twelve days later they were again applied; at the end of three weeks scarcely a trace of the tumor was left, and the needles were introduced at only one point. The result was perfect and only a small scar remained.

BURNETT.

LANDESBURG. Phthiriasis pubis of the eyebrows. *Phil. Med. Bull.*, vol. iv, No. 6.

In a child eczema developed in the region of the eyebrows. After the removal of the crusts the parasites and their ovula could be easily recognized.

ARMAIGNAC. Sur les conséquences de la gravité des plaies du sourcil. *Rev. d'ocul. du sud-ouest*, No. 8, p. 145.

III—LACHRYMAL APPARATUS.

1. GALEZOWSKI. Nouvelle méthode de traitement des voies lacrymales au moyen d'un dilateur. *Rec. d'ophth.*, 1882, No. 8, p. 449.

2. CHIBRET. Une méthode de stricturotomie destinée à remplacer le procédé de Bowman dans le traitement du rétrécissement des voies lacrymales. *Rec. d'ophth.*, 1882, No. 6.

3. MOOREN. *Five lustra of ophthalmological practice*, p. 83.

4. CAMUSET. Des tumeurs à leptothrix des voies lacrymales. *Rev. d' ocul. du sud-ouest*, vol iii, p. 217.

GALEZOWSKI (1) has devised an instrument by means of which he forcibly dilates strictures of the lachrymal canal. The instrument acts like a glove-stretcher. The portion introduced into the lachrymal canal is no thicker than No. 4 of Bowman's probes; by pressing upon the other end of the instrument, the two branches forming the portion within the canal separate and dilate it to an extent corresponding about to No. 10 or 12 of Cooper's probes.

MARCKWORT.

CHIBRET (2) is opposed to the dilatation of strictures of the lachrymal canal by means of probes; he recommends incision according to a modification of Stilling's method.

MARCKWORT.

MOOREN (3) treats catarrh of the lachrymal sac and duct with lukewarm solutions. When the local irritation has somewhat subsided, lukewarm solutions containing a little boracic, salicylic, or carbolic acid are injected into the lachrymal canal. In a few cases only Bowman's probes were introduced.

CAMUSET (4) reports a case in which masses of leptothrix completely filled the lachrymal duct.

1. CARRÉ. De l'inflammation de la glande lacrymale. *Gaz. d' ophth.*, No. 5, 1882.

2. STREATFEILD. Syphilitic inflammation of the lachrymal gland. *Brit. Med. Jour.*, Sept. 30, 1882, p. 635.

3. SNELL, S. A case of dislocation of the lachrymal gland. *Ophth. Rev.*, vol. i, No. 8, p. 207.

4. WHITE. Tumor of the lachrymal gland. *These ARCHIVES*, March, 1882, vol. xi, p. 62.

CARRÉ. (1) saw a tumor as thick as a finger develop under the left upper eyelid of a man of thirty-five, together with erysipelatous swelling and redness. An incision showed it to be due to an inflammation of the lachrymal gland.

v. MITTELSTADT.

STREATFEILD (2) reports a case of dacryo-adenitis of specific origin.

FITZGERALD.

PARINAUD. Fistule dentaire simulant une fistule lacrymale. *Journ. des connaiss. méd.*, 1882, No. 36.

In a child, seven years old, an abscess developed in the region of the lachrymal sac, resulting in a fistula. At the same time there was also a dental fistula of the carious upper canine tooth. Parinaud assumes alveolar periostitis with formation of a fistula, and explains its peculiar position by the peculiar arrangement of the alveoli of the upper maxillary of children. Cured by extracting the tooth in question.

v. MITTELSTADT.

IV.--MUSCLES AND NERVES.

1. SCHNELLER. Contributions to the knowledge of strabismus. *Arch. f. Ophth.*, vol. xxviii, 2, p. 97.

2. FANO. Du strabisme chez les jeunes enfants; traitement. *Le scalpel*, No. 52.

3. BONNEMAISON. Des differents procédés chirurgicaux pour le traitement du strabisme monolatéral excessif. *Thèse de Paris*, 1882.

4. ABADIE. Strabisme. Traitement opératoire. *Nouveau dictionnaire de méd. et de chir.*, vol. xxxiii, p. 709.

5. JAVAL. Strabisme. *Ibid.*, p. 698.

6. HOCK. Strabismus. *Eulenburg's Real-Encycl. d. ges. Heilk.*

SCHNELLER (1) reports his investigations on the field of fixation in cases of divergent and convergent squint. It is characteristic of accommodative convergent strabismus that the squint disappears either at once or after a few days or weeks, when corrected with the proper glass, and that the extent of the field of fixation remains within the normal. Amblyopia of both eyes favors the development of convergent strabismus, though the degree of hypermetropia may be but a low one, also all the factors which tend to diminish the value of binocular vision. Muscular convergent squint disappears under the influence of the proper glass, either at once or after the lapse of a few days or weeks; the extent of the fixation field of the interni also exceeds that of the externi more than under normal conditions. In divergent squint the degree of strabismus is not entirely proportional to the preponderance of the external recti.

In strabismus, with normal motility of the muscles, an operation is unnecessary—glasses will suffice; in muscular strabismus an exact examination of the field of fixation must be made in order to find a suitable method of operation. Schneller thinks that the most important result gained by his investigations is the distinction which must be made between refractive, accommodative, and muscular strabismus.

FANO (2) thought he had shown once before that convergent squint is more common in myopia than in hypermetropia of the deviating eye. He is opposed to the correction by glasses, and recommends antispasmodic remedies, besides orthopædic treatment, as he ascribes strabismus to an unequal distribution of nervous influences.

In advancement, ABADIE (4) makes a vertical incision at the corneal margin, and abscises a strip about 2 mm. wide from the outer edge of the wound. After detaching the muscle he applies the suture by passing the needle first through the conjunctiva bordering on the cornea, and then through the muscle and outer conjunctival flap.

V. MITTELSTADT.

JAVAL (5) discourses on the history of strabismus, the development of the various kinds, their course and treatment.

1. LLOYD, OWEN. Hereditary nystagmus. *Ophth. Rev.*, July, 1882.

2. BENSON. On a case of voluntary nystagmus. *Ophth. Hosp. Rep.*, vol. x, p. 343.

3. DRANSART. Le nystagmus et l'héméralopie chez les mineurs. *Ann. d'ocul.*, vol. lxxxviii, p. 150.

LLOYD, OWEN, (1) could prove heredity in one case of nystagmus.

According to DRANSART (3) nystagmus consists in a paresis of the muscles and nerves of the eye due to nervousness. There is no central cause. Nutritive

disturbances and poor illumination are of only secondary consequence in its etiology. v. MITTELSTADT.

BENSON (2) reports the case of a young lady of twenty-four, who voluntarily could produce nystagmus. FITZGERALD.

1. KAHLER and PICK. The localization of partial paralysis of the oculomotor nerve. *Prager Zeitschr. f. Heilk.*, vol. ii, p. 301.

2. ROSENSTEIN. Total paralysis of all the muscles of the eye of cerebral origin. *Inaug. Dissert.*, Breslau, 1882.

3. RAVÀ. Contributo allo studio della paralisi dei nervi dell'occhio. *Casuistica clinica. Ann. d'ottalm.*, vol. xi, fasc. 2 and 3.

In a workman who had suffered from partial paralysis of the oculomotor nerve, KAHLER and PICK (1) found the right posterior cerebral artery converted into a firm, solid cord to the extent of $4\frac{1}{2}$ mm., and the right pedunculus cerebri, especially the pes, swollen und soft. The authors believe that in man the pupillary fibres of the oculomotor nerve lie in its anterior root fascicles, those of the external muscles of the eye in the posterior fascicles.

ROSENSTEIN (2) describes a case of total paralysis of all the muscles of the eye, of cerebral origin.

RAVÀ (3) describes the case of a young man of twenty, with complete paralysis of the six muscles of the eye and the levator palpebræ; the sphincter iridis alone was not affected. The power of accommodation could not be tested. The eye was slightly turned downward and inward, and could not be moved from this position. Although the disease had been preceded by a long-continued attack of intermittent fever, combined with severe headache, the author had to exclude a cerebral cause on account of the intact movement of the iris, and designate the paralysis as simply rheumatic. Complete recovery after six weeks of electric treatment. DANTONE.

1. ANGELUCCI. Affezione dolorosa del' nervo sopraorbitale. Nevrotomia. Guarigione. *Quadri statistici e frammenti d' oftalmologia*. Roma, 1882.

2. BURSAX. De la resection du nerf sous-orbitaire dans la nevralgie faciale rebelle. *Thèse de Paris*, 1882.

3. FILATOW, PETER. A case of intermittent neuralgia, with retinal irritation. *Medisinskoje Obosrenije*, July, 1882, p. 71.

4. BADAL. L' élongation des nerfs et de ses applications au traitement de la nevralgie du trijumeau. *Gaz. d' ophth.*, No. 5, 1882.

5. BAMBDON. Nerve-stretching for supraorbital neuralgia, with remarks on nerve-stretchings and their bearing on the mode of transmission of nerve-impulses. *The Lancet*, No. 4, July, 1882, p. 138.

6. ALEXANDROFF. Contribution à l' étude de l' élongation des nerfs crâniens. *Arch. d' ophth.*, vol. ii, No. 4.

ANGELUCCI. (1) performed neurotomy of the supraorbital nerve with good result in a case of intermittent neuralgia which had lasted two years. The accompanying megrim, as also the spasm of accommodation and of the orbicularis muscle, disappeared very soon after the operation. DANTONE.

FILATOW (3) reports a case of intermittent quotidian neuralgia between the brows and in the lid, accompanied by extreme photophobia, cured by quinine. HIRSCHMANN.

BADAL (4) stretched the supra- and infra-orbital nerves in the cases of two women with neuralgia of the fifth nerve, paralysis of the oculomotor, and atrophy of the optic nerve. The success was very moderate. v. MITTELSTADT.

ALEXANDROFF (6) stretched the supraorbital nerve in a very nervous man of thirty-one, who suffered from severe blepharospasm on both sides, tic douloureux, and hyperæsthesia of the skin of the face. On the right side of the brow there were old scars. On the right side complete success was obtained, on the left marked improvement. v. MITTELSTADT.

V.—ORBIT AND NEIGHBORING CAVITIES.

1. HUBER. Clinical contributions to the knowledge of orbital tumors. *Inaug. Diss.*, Zurich, 1882.
2. HULKE. Osteoma of the orbit. *The Lancet*, No. 22.
3. PEYROT. Sur une observation de tumeur de l'orbite. *Bullet. et mém. de la soc. de chir.*, vol. viii, 4.
4. TWEEDY. On a case of ivory exostosis of the orbit. *Ophth. Hosp. Rep.*, vol. x, p. 303.
5. REID. Enchondroma of orbit. *Brit. Med. Jour.*, April, 1882, p. 615.
6. DUFAIL. Des sarcomes de l'orbite et de leur traitement par l'extirpation des parties molles. *Thèse de Paris*, 1882.
7. SALTINI. Cisti orbitaria. Ussegnazione clinica. *Gazz. d'ospidali*, Nos. 31 and 32, April, 1882.
8. CARRÉ. Kystes dermoïdes périorbitaires. Observation d'un kyste de la tête du sourcil. *Gaz. d'ophth.*, No. 8, 1882.
9. NETTLESHIP. Serous cystic tumor in eyebrow. *Trans. Oph. Soc. of the Unit. Kingd.*, vol. ii, p. 251, 1882.
10. LAWSON. Hydatid tumor of orbit. *Ophth. Hosp. Rep.*, vol. x, 3, p. 301.
11. ELONI. Étude clinique et anatomique sur un cas d'angiome caverneux enkysté de l'orbite. Laboratoire de la clinique ophthalmologique de Lyon. *Arch. d'ophth.*, vol. ii, No. 3.
12. CAMUSET. Angiome caverneux capsulé de l'orbite. *Gaz. d'ophth.*, No. 6, 1882.
13. CAPDEVILLE. Angiome caverneux de l'orbite. Marseille, 1882.
14. PEYOT. Angiome fibreux de l'orbite. *Gaz. hebdom. de méd. et de chir.*, Feb. 7, 1882.
15. WEISS. Tumeur pulsatile de l'orbite; ligature de l'artère primitive; guérison. *Rev. d'ocul. du sud-ouest*, vol. iii, 4, p. 97.
16. POLLAK. Monocular exophthalmus. *St. Louis Med. and Surg. Jour.*, vol. xlii, 4, p. 441.
17. PEÑA, A. de. Hydatidic tumor of the orbit (Echinococcus). *La oftalmologia práctica*, April, 1882.
18. BARABACHEW, P. Echinococcus in the orbit. (From the ophthalm. clinic of Prof. Hirschmann in Charkow.) *Wratsch*, No. 19, 1882.

19. SKLIFASSOWSKY. Pulsating exophthalmus ; arterio-venous aneurism of right internal carotid ; ligature of the common carotid. *Wratsch*, No. 13, 1882.
20. BULL. Lesions of the orbital walls and contents due to syphilis. *New York Med. Jour.*, August, 1882.
21. GALEZOWSKI. Des affections scrofuleuses de l'œil et de l'orbite. *Jour. de théér.* 1882, No. 3.
22. NETTLESHIP. Case of orbital cellulitis. *St. Thomas' Hosp. Rep.*, vol. xi, 1882.
23. POST, G. E. Case of exophthalmus with blindness. *The Lancet*, May 6, 1882.
24. LOVERDO. Des fractures du plancher de l'orbite siégeant surtout au niveau sous-orbitaire. *Thèse de Paris*, 1882.
25. WEINBERG. Exophtalmie à la suite des dents cariés. *Rec. d'ophth.*, vol. iii, No. 7, p. 441.
26. RAMPOLDI, R. Un caso di tenonite primitiva. *Ann. d'ottalm.*, May, vol. xi, p. 170.
27. LIPPINCOTT. Abscess of the orbit. *New York Med. Rec.*, 1882, p. 550.
28. HEYL, A. G. Some thermometric observations in a case of traumatic diphtheria of the orbit. *Phil. Med. Times*, July 29, 1882.
29. CHAUVEL. Des amblyopies traumatiques. Hémioptie horizontale de l'œil droit suite d'un coup de fleuret à l'angle interne de l'orbite. *Gaz. hebdom. de méd. et chir.*, Feb. 10, 1882.

HUBER (1) publishes two cases of bony exostosis and one case of syphiloma of the roof of the orbit, one of adenoma in the orbit, one of a round-cell sarcoma beginning in the right lachrymal gland, one of a spindle-cell sarcoma of the same origin, and one of a congenital dermoid cyst of the orbit. The majority of these cases were operated upon. They proved that tumors which generally are considered very dangerous may be removed with the best results, and that enucleation, besides, is necessary in only the worst cases. One eye, which had undergone considerable changes, recovered its normal condition and functions to an unexpected degree. The results of the operation seemed to indicate that a number of anomalies of structure and function of the globe are due to simple mechanical influences.

In a girl of four, HULKE (2) removed an osteoma springing from the floor of the orbit.

NETTLESHIP.

In a man of twenty-five, TWEEDY (4) found an ivory exostosis which occupied the upper and inner part of the orbit, and had its origin in the region of the lachrymal sac. The autopsy showed that the tumor extended into the frontal sinus. The latter was so distended by it that the anterior lobe of the cerebrum had been displaced. The tumor also penetrated into the nasal cavity and into the sphenoid bone ; here it had caused a basilar meningitis.

FITZGERALD.

In a young man of nineteen, REID (5) removed a tumor of the outer wall of the orbit. It adhered to the periosteum and extended back as far as the optic foramen and completely enclosed the lachrymal gland. Five months later the tumor had again formed, and was again removed. Microscopic examination showed it to be an enchondroma.

FITZGERALD.

In a man of forty-seven, SALTINI (7) observed a cyst in the right orbit. The globe projected 1 *cm.*, was turned downward, and immovable. The fundus showed the usual symptoms of stasis. The cyst was cured by drainage. It contained crystals of cholesterine and hæmatoidine, and blood-, pigment- and fat-corpuscles. Saltini considered the cyst to be an acquired one, to be of a serous kind, and to have perhaps sprung from the mucous sac lying between the tendon of the superior rectus and levator palpebræ.

DANTONE.

In a man of twenty, CARRÉ (8) extirpated a dermoid cyst the size of a pigeon's egg from the upper part of the orbit. The tumor, though scarcely visible, had been observed at the age of one and a half years.

v. MITTELSTÄDT.

NETTLESHIP (9) saw a large oval cyst at the orbital margin near the eyebrows. When punctured a thin yellowish liquid escaped which soon formed again. By injecting tincture of iodine the tumor was reduced one half.

FITZGERALD.

LAWSON (10) describes a cystoid tumor. The patient had complained of diplopia for seven or eight years, until sight was almost destroyed. Exophthalmus then gradually formed. Lawson removed the tumor; recovery without accident.

FITZGERALD.

ELONI (11) removed an encapsuled cavernous angioma of the right orbit the size of a hazel-nut, which had developed in a woman of fifty-two, in the course of three years, after a painful inflammation of the eye, as she stated. There was moderate exophthalmus. The tumor lay under the right external rectus, so that tenotomy was necessary in order to detach it from its base. Eight days after the operation the optic disc appeared white and the blood-vessels thin. Eloni attributes these symptoms to hemorrhage into the sheath of the optic nerve and to division of some ciliary nerves.

v. MITTELSTADT.

In a man of thirty-two, CAMUSET (12) observed the development of right-sided exophthalmus in the course of a year, accompanied by symptoms of inflammation and diplopia; it increased during the following eight years, sometimes increasing, sometimes diminishing. The outer canthus was split and the conjunctiva incised, when after dividing the orbital fascia a round tumor became visible, which could easily be detached from its attachments to the external wall and apex of the orbit. The lachrymal gland was removed with it. Recovery within a week. The tumor proved to be an angioma.

v. MITTELSTADT.

PEÑA (17) reports an echinococcus of the orbit.

BARABACHEW (18) observed the sudden development of exophthalmus in a peasant girl of twelve; motility was checked in every direction; the cornea necrotic. Upward and inward of the globe there was a tumor adhering to the periosteum, which did not fluctuate and made the impression of a firm neoplasm. Besides amaurosis there was severe headache. The tumor had been growing for a year. The eye was enucleated, and an echinococcus-tumor removed of the size of a walnut.

HIRSCHMANN.

In a man of forty-five, SKLIFASSOWSKY (19) found œdema of the lids and conjunctiva, exophthalmus, wide pupil, and a subjectively and objectively audible murmur; the cornea was dull; V=0; and the eye immovable. The sound ceased when the carotid was compressed, but the exophthalmus remained. Digital compression was tried for a week, but failed. All the symptoms, however, disappeared after ligating the common carotid artery. Amaurosis continued and opacity of the lens developed.

HIRSCHMANN.

In a syphilitic person, BULL (20) saw periostitis and gummata of the orbit, hyperostosis of several bones, and limited caries. BURNETT.

NETTLESHIP (22) reports two cases of inflammation of the orbital tissue.

NETTLESHIP.

POST (23) saw exophthalmus, together with amaurosis, due to necrosis of the wing of the sphenoid bone. After the necrotic piece of bone had been removed the exophthalmus disappeared. NETTLESHIP.

WEINBERG (25) reports the clinical history of a case of exophthalmus which disappeared after the extraction of a carious tooth. MARCKWORT.

RAMPOLDI (26) observed a case of primary tenonitis, which began with chemosis, exophthalmus, and complete immobility of the eye, sight remaining intact. Later, exudative choroiditis set in, destroying vision. The symptoms of irritation disappeared after the conjunctiva had ruptured at the insertions of the superior, internal, and inferior rectus muscles and a quantity of thin pus had been discharged. DANTONE.

HEYL (28) reports a case of enucleation for melanosarcoma. Diphtheritic inflammation of the remaining conjunctiva followed, during which the temperature in the orbit rose to 100°. BURNETT.

1. FITZGERALD, C. E. On unilateral exophthalmus and the value of the sign by von Gräfe as characteristic of Graves' disease. *Trans. Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 233, 1882.

2. SANSON. Case of exophthalmus, with none of the cardiac and thyroid phenomena of Graves' disease. *Trans. Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 241, 1882.

3. NEPREN. Goftre exophthalmique. *Soc. de chir.*, April 12, 1882.

4. BERNARD. Contribution à l'étude du gofre exophthalmique. *Thèse de Paris*, 1882.

FITZGERALD (1) reports four cases of Graves' disease, two men and two women. In one case the exophthalmus of the second developed only gradually. The picture of the disease was incomplete in every case, and it is especially interesting that the symptom mentioned by von Gräfe, the imperfect mobility of the upper lid when looking down, was observed only on the side on which there was exophthalmus. FITZGERALD.

In a man of forty-one, with Graves' disease, SANSON (2) found slight pulsation whenever he became excited. The heart appeared normal, the tension of the arteries reduced. The degree of exophthalmus was extraordinary. No mention is made of von Gräfe's symptom. His condition was improved by the use of digitalis and galvanization of the cervical ganglion. FITZGERALD.

KÖNIG, EMIL. On empyema and hydrops of the frontal sinus. *Inaug-Diss.*, Berne, 1882.

Empyema and hydrops had caused a considerable swelling of the frontal sinus.

VI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

1. BRACHET. Conjunctivites simples, leur nature, leur traitement. *Rec. d'ophth.*, vol. iii, No. 7, p. 410.

2. BAYER. On Credé's procedure for the prevention of blennorrhœa neonatorum. *Arch. f. Gynæk.*, vol. xix, p. 258.
3. HORNER. On the prophylaxis of blennorrhœa neonatorum. *Correspondenzbl. f. Schweizer Aerzte*, 1882, No. 7.
4. PAULSEN. The application of the cold douche in blennorrhœa neonatorum. *Berl. klin. Wochenschr.*, No. 21, 1882.
5. ARMAIGNAC. Etiologie et traitement de l' ophthalmie purulente chez les nouveau-nés et les adultes. *Rev. d' ocul. du sud-ouest*, vol. iii, Nos. 6 and 7.
6. KÖNIGSTEIN. The prophylaxis of blennorrhœa neonatorum. *Arch. f. Kinderheilk.*, vol. iii, Nos. 9 and 10.
7. RUTE, NARAJO Y. Las discusiones sobre la peritomia en la conjunctivitis blennorrhagica. *Ophthalm. practica*, anno i, No. 6, p. 126.
8. BADER. The treatment of gonorrhœic ophthalmia. *The Lancet*, No. 15.
9. NETTLESHIP. Destructive ophthalmitis in children. *The Lancet*, No. 16.
10. CARRÉ. Apropos du traitement de la conjonctivite purulente des nouveau-nés. *Gaz. d' ophth.*, No. 10, 1882.
11. WECKER. Prophylaxe de l' ophthalmie des nouveau-nés. *Gaz. des hôp.*, April, 1882.
12. BAILLY. Traitement de l' ophthalmie purulente des nouveau-nés. *Gaz. des hôp.*, February, 1882.
13. ABADIE. Traitement de la conjonctivite blennorrhagique. *Gaz. des hôp.*, April, 1882.
14. BRAME. Deux cas particuliers d' ophthalmie purulente chez des adultes. *Gaz. des hôp.*, September, 1882.
15. MEYER, S. Ophthalmoblenorrhœa neonatorum. *Hospitals tidende*, June 21, 1882.
16. KRAUSE. The micrococci of blennorrhœa neonatorum. *Centralbl. f. prakt. Augenheilk.*, 1882, p. 134.
17. LUBRECHT. The treatment of blennorrhœa neonatorum et gonorrhœica. *Centralbl. f. prakt. Augenheilk.*, 1882, p. 248.
18. DRANSART. Conjonctivite purulente et conjonctivite catarrhale par cause rhumatismale. *Ann. d' ocul.*, September and October, 1882.
19. LANDESBERG. Diphtheria of the conjunctiva. *Med. Bull.*, vol. iv, No. 5.
20. TORO, DEL. Observations sur un nouveau cas de conjonctivite diphthérique. *Rev. d' ocul. du sud-ouest*, vol. iii, No. 4, p. 81.
21. FONTAN. Un cas d' ophthalmie diphthéroïde. *Rec. d' ophth.*, No. 9, p. 520.
22. BARETTE. Contribution à l' étude de l' ophthalmie diphthérique et de son traitement. *Arch. d' ophth.*, vol. ii, No. 2.
23. MOOREN. *Five lustra of ophthalmological practice*, p. 87.
24. KNAPP. On croup of the conjunctiva, with remarks on the treatment of the contagious forms of conjunctivitis. These ARCHIVES, vol. xi, p. 1, etc. *Arch. f. Augenheilk.*, vol. xii, p. 61.

25. CRITCHETT, A. and Jules. Chronic membranous inflammation of the conjunctiva. *The Lancet*, No. 16.

BRACHET (1) discusses conjunctivitis in general, and calls attention to the necessity of treating co-existent affections of the cornea, the lachrymal apparatus, etc. He speaks besides in particular of phlyctenular and lachrymal conjunctivitis. The latter name Galezowski has applied to a form of conjunctivitis produced and kept up by stenosis of the lachrymal duct. MARCKWORT.

BAYER (2) has employed Credé's procedure for the prevention of blennorrhœa neonatorum, the instillation of a two-per-cent solution of nitrate of silver, in the Lying-in Institute at Stuttgart, and in consequence did not see a single case among 361 children.

HORNER (3) has treated 468 cases of blennorrhœa of the new-born in the course of twenty-two years. In 122 there were severe inflammations of the cornea; in 35 it had already perforated; in 38 the cornea became affected during treatment. Of the last-mentioned, 14 healed without producing maculæ of consequence. Horner is opposed to the procedure of Credé and to cleansing the eye with a two-per-cent solution of carbolic acid in private practice, as the midwives pour the solution directly into the eye and cauterize the cornea. The midwives, however, should be forced to observe the precautions necessary to prevent blennorrhœa of the new-born, by irrigation of the vagina of the mother, by cleansing the instruments and hands, and to give immediate notice in case the eyes become affected.

PAULSEN (4) employs the cold douche in blennorrhœa of the new-born with good result.

KÖNIGSTEIN (6) first observed 1,092 children of whom 4.76% were affected with blennorrhœa. 1541 children were then treated according to Hausmann's procedure, 2% of whom became affected. Of 1,300 children treated according to Credé, only $\frac{1}{4}$ % became affected.

RUTE (7) employed Arit's method of circumcision of the chemotic conjunctiva in blennorrhœa with good result.

CARRE (10) advocates the use of nitrate of silver above all, even in the beginning of blennorrhœa.

In blennorrhœa, both of new-born and of adults, ABADIE (13) cauterizes the conjunctiva from the first day of inflammation with a 3-4% solution of nitrate of silver every 12 hours. Ice-applications must be made besides, if possible, together with a solution of boracic acid.

BRAME (14) saw rapid recovery in the incipient stage by using iodide of silver.

MEYER (15) gives the percentage of blennorrhœa of the new-born in the Lying-in Hospital at Copenhagen. He recommends Credé's procedure as the best preventive.

KRAUSE (16) succeeded in obtaining the micrococci of blennorrhœic pus by impregnating mutton blood-serum with it and treating it in the moist chamber and the incubator. They are always attached to each other in the secretion in dumb-bell shape. The result of inoculation of animals with the pure material was negative, in a new-born rabbit only profuse suppuration of the conjunctiva set in.

LUBRECHT (17) cleansed the eyes daily, both in blennorrhœa of the new-born and gonorrhœic ophthalmia, with a dilute solution of corrosive sublimate. Although this did not check the disease, it had a beneficial influence on its course.

DRANSART (18) reports a case of unilateral purulent conjunctivitis of rheumatic origin. (It is doubtful whether it was not produced by infection.—REP.)

MARCKWORT.

In a girl of fifteen DEL TORO (20) observed the rapid development of a tumor of the lids of considerable size, followed by rapid hardening. A small quantity of viscid liquid was discharged, which dissolved in the tears but inflamed the skin of the cheeks. Toro diagnosticates diphtheritic conjunctivitis in the stage of fibrous infiltration. Improvement was rapid under energetic treatment in the course of five days.

According to FONTAN's (21) investigations, fibrino-purulent pseudo-membranes are formed in purulent conjunctivitis; in diphtheritic conjunctivitis, pseudo-membranes of epithelial origin. Based on the clinical history of a case Fontan sets up a third form, which he calls diphtheroid conjunctivitis. The membrane which forms in this disease contains, among other elements, tissue of the conjunctiva, but not the deformed epithelial formations characteristic of diphtheria.

MARCKWORT.

In discussing the clinical history of diphtheritic conjunctivitis, BARETTE (22) mentions as unusual symptoms the partial loss of the lashes and ptosis. The latter, observed twice in ten cases, partially disappeared and must be considered as diphtheritic paralysis. The lashes partly fell out in all cases and did not come again. Barette treats diphtheria with warm cataplasms; instead of scarification, he energetically removes the membranes. In some cases the subcutaneous injection of pilocarpine seems to have been of benefit.

V. MITTELSTADT.

In the first stage of diphtheritic conjunctivitis, MOOREN (23) used lukewarm applications with excellent result; in the second, which is introduced by sup-puration accompanying and following the discharge of the membranes, the mitigated nitrate of silver stick was successfully employed.

KNAPP (24) defines the nature of the croupous process as follows: It differs from the diphtheritic affection by the softness, the absence of heat and swelling of the lids, the superficial attachment and easy removal of the croupous membrane, the appearance of the mucous membrane and the lid itself under it, by the relative immunity of the cornea and the tendency to papillary proliferations. The croupous membrane covering the papillary body is rapidly renewed when removed; in contradistinction to diphtheria it never attacks the conjunctiva of the globe, and rarely the cornea.

CRITCHETT and JULES (25) also report on diphtheritic conjunctivitis.

1. HORNER. The follicular inflammation of the conjunctiva. *The diseases of the eye in childhood*, p. 305.

2. NUEL. Des glandes tubuleuses pathologiques dans la conjunctive humaine. *Ann. d' ocul.*, July-Aug., 1882. *Ann. et bull. de la soc. de méd. de Gand*, June, 1882.

3. HEISRATH. The treatment of granular conjunctivitis by deep and extensive incisions. *Berlin. klin. Wochenschr.*, Nos. 28, 29, and 30.
4. BLANCHE, J. AGUILAR. The excision of the semilunar fold in granulations. *Revista de ciencias medicas*, Barcelona, March, 1882.
5. VENNEMANN. Les complications du trachome. *Rev. méd. Louvain*.
6. DRUSCHININ. Statistics on the etiology of trachoma. *Milit. med. Journ.*, Jan., 1882.
7. MINOR. Boracic acid for granular lids. *N. Y. Monthly R.*, Feb., 1882.
8. ABADIE. Quelques mots à-propos du traitement de la conjonctivite granuleuse. *Ann. d' ocul.*, May, June, Sept., Oct., 1882.
9. MOORE. *Five lustra of ophthalmological practice*, p. 92.
10. DIANOUX. De l' ophthalmie purulente provoquée comme moyen thérapeutique. *Progr. méd.*, No. 41, p. 771.
11. SEDAN. Au sujet de la cure possible de la conjonctivite granuleuse chronique par inoculation purulente. *Rev. d' ocul. du sud-ouest*, vol. iii, No. 9.
12. VILFROY, ALBERT. Du pannus et son traitement par inoculation blennorrhagique. Lille, 1882.
13. WECKER. L' ophthalmie purulente factice produite au moyen du Jequirity ou liane à réglisse. *Ann. d' ocul.*, 1882, July-Aug.; *Rev. d' ocul. du sud-ouest*, vol. iii, No. 9, p. 192.
14. MOURE. L' oftalmia purulenta artificiale prodotto dal Jequirity. *Bollet. d' ocul.*, vol. v, No. 3, p. 91.

HORNER (1) describes as follicular inflammation of the conjunctiva (follicular catarrh, follicular trachoma, granular trachoma, chronic granulations), not the presence of a few pale granules in the lower fornix and near the outer commissure, something not uncommon in normal eyes and in mild forms of catarrh, but the chronic and acute development of granulations *en masse*. In all varieties of conjunctivitis in which the development of follicles is the most noticeable change, there is a lymphoid infiltration, which assumes the form of a well-defined follicle, the more slowly it set in and adapted itself to the resistance of the tissues, but loses it in proportion to the intensity of the inflammation. The infiltration around the deeper blood-vessels is of the greatest importance in its consequences. These granulations may disappear without producing any permanent changes, but the process is generally of very long duration. In the mild forms of follicular inflammation the disease lasts much longer, but can be cured with certainty. If, however, the inflammation is intense, as individually or corporately may be the case, and circumstances do not admit of a change, the results are grave: small ulcers form at the margin of the cornea; or small, round infiltrations, resembling eczema or marginal pannus, develop, while the inflammation of the conjunctiva itself can only be reduced very slowly, the results of the diffuse inflammation blending with those of the follicular development. Chronic follicular catarrh may be cured by the strict observation of hygienic measures, fresh-air exercise, ventilation of the bedroom, etc. No energetic treatment of the conjunctiva should be attempted. In the more severe forms, salves of

acetate of lead or sulphate of copper are indicated. In acute, diffuse inflammation of a follicular character energetic local treatment should be avoided in the beginning, and hygienic measures only made use of; when the secretion becomes more profuse, nitrate of silver may be used. If the cornea becomes affected, eserine should be instilled and an antiseptic bandage employed.

NUEL (2) discusses the glandular formations found by Kuhnt in the human conjunctiva, and concludes that they are genuine tubular glands, in opposition to the opinion that they are the result of proliferation of the papillæ. In agreement with Jacobson, he does not see in them any thing peculiar to trachoma.

MARCKWORT.

HEISRATH (3) recommends deep incisions in trachoma.

AGUILAR BLANCH (4) excises the semilunar fold when covered with granulations.

DRUSCHININ (6) describes the prevalent views as to the etiology of trachoma, and tries to prove by statistics that dampness of the dwellings and its consequences is the essential cause of its development.

HIRSCHMANN.

MINOR (7) recommends the use of boracic acid in form of powder in trachoma, especially in fresh granulations.

BURNETT.

According to Abadie (8), the inoculation of blennorrhœic pus is only indicated in trachoma when the conjunctiva is still really inflamed, but not when the inflammation is over, the conjunctiva atrophic, and the cornea thin, leucomatous or staphylomatous.

MARCKWORT.

In inveterate pannus MOOREN (9) inoculates blennorrhœic pus without fear, as a reliable means of obtaining a cure. The secretion obtained from an otherwise healthy new-born child affected with blennorrhœa is the best.

VILFROY (12) advises the inoculation of blennorrhœic pus in dense pannus of both eyes only, as there is then no danger to the cornea.

MARCKWORT.

WECKER (13) was informed by a gentleman who formerly had suffered from trachoma, that he had obtained an excellent result in himself by the use of Jequirity (*abrus precatorius*). This substance is used in Brazil for trachoma with excellent results. Wecker makes use of it in diphtheria, granulations and pannus of long standing, in order to produce rapid suppuration. A great advantage is that its action can be dosed. Experience must show whether or not it acts advantageously upon the ulcerous processes of the cornea.

MOURE (14) also experimented with Jequirity.

1. DEUTSCHMANN. Iodoform in ophthalmology. *Arch. f. Ophth.*, vol. xxviii, p. 214.

2. MOOREN. *Five lustra of ophthalmological practice*, p. 94.

3. SMITH, PRIESTLEY. A case of gonorrhœic ophthalmia rapidly cured by iodoform. *Ophth. Rev.*, May 1, 1882.

4. GROSSMANN. Note on the iodoform treatment of blennorrhœa neonatorum. *Ophth. Rev.*, vol. i, pp. 141 and 214.

5. DUJARDIN. A case of blennorrhœa cured by iodoform. *Ophth. Rev.*, Sept., 1882.

6. FISCHER. Iodoform in ophthalmology. *Mitth. d. Vereins d. Aerzte in Steiermark*, Vienna, 1881.

7. SCOTT. Diphtheritic conjunctivitis treated with iodoform. *Boston Med. and Surg. Journ.*, July, 1882, p. 16.
8. SCHINDLER. Iodoform in ophthalmology. *Aeratl. Intelligensbl.*, 1882, Nos. 28 and 29.
9. SCHENKL. Iodoform. *Prager med. Wochensch.*, vol. vii, Nos. 38, 39, and 40.
10. MACONSHIC. Iodoform in purulent ophthalmia. *Oph. Rev.*, vol. i, No. 10, 1882, p. 271.
11. MILLES. Iodoform in purulent ophthalmia. *Ophth. Hosp. Rep.*, vol. x, 3, p. 386.
12. GALEZOWSKI. De l'iodoform dans les affections oculaires. *Rec. d'ophth.*, June, 1882.
13. FOURGUETTE. Essai sur l'emploi thérapeutique de l'iodoform en oculistique. *Thèse de Paris*, 1882.
14. KANZAURO. The importance of iodoform in ocular affections. *Wratsch*, No. 42.

DEUTSCHMANN (1) uses iodoform in solid form, as a powder and as a salve, and saw injuries of the cornea heal well after dusting it into the eye. It also acted beneficially in operative wounds. It failed in ordinary conjunctival catarrh, blennorrhœic affections, and granular conjunctivitis, but proved very effective in the serpent ulcer of Sæmisch.

MOOREN (2) saw trachoma disappear after using iodoform, which he rubbed upon the lids in form of collodium (5:30), or brought in contact with the conjunctiva in form of a salve (0.15:10).

PRIESTLEY SMITH (3) treated a case of gonorrhœic ophthalmia with iodoform. Improvement was so rapid that the patient was discharged after a week.

FITZGERALD.

GROSSMANN (4) used iodoform in form of a powder in purulent conjunctivitis. It must be reduced to an impalpable powder, otherwise it irritates the cornea mechanically.

DUJARDIN (5) also obtained good results with iodoform in a severe case of purulent ophthalmia in a child of 8 months.

FITZGERALD.

MACONSHIC (10) also recommends it.

MILLES (11) used iodoform in form of a powder and of a salve, and found it effective when used in the beginning of the affection. He treated gonorrhœic ophthalmia with it, but combined with it the use of boracic acid and ice-applications. It also acted beneficially in corneal infiltrations.

FITZGERALD.

GALEZOWSKI (12) made use of a salve of iodoform (1:10) with good results in a case of croupous conjunctivitis, in which all other means had failed. He introduced it in large quantities into the conjunctival sac.

MARCKWORT.

FOURGUETTE (13) recommends iodoform salve in blennorrhœa, croupous conjunctivitis, dacryocystitis, and the parenchymatous affections of the cornea, especially the scrofulous ones.

V. MITTELSTADT.

SCHENKL (9) made use of iodoform in form of a salve or as iodoform-collodium. It did not produce any better results in blepharitis and phlyctænular oph-

thalmia than the treatment generally adopted, though it proved useful. In trachoma and interstitial keratitis the results were much poorer, but did good service in chalazia, phlyctænar pannus, serpiginous corneal ulcers, injuries of the cornea, and lachrymal affections.

FISCHER (6) used iodoform as a powder, as gelatine-bacilli, and as an almond solution. He recommended it in scrofulous and trachomatous pannus, in lachrymal affections and as an antiseptic in operations. He also found that it stimulated granulation and caused rapid regeneration of the epithelium. In blennorrhœa and trachoma the present methods of treatment were more effective.

1. HOTZ. Bad results of dusting calomel into the eye. These ARCHIVES, vol. xi, p. 49. *Arch. f. Augenheilk.*, vol. xi, p. 400.

2. ROCKLIFFE. A case of acute conjunctivitis caused by the electric light. *The Lancet*, No. 8.

3. GÁLEZOWSKI. De la xérophthalmie parenchymateuse et de son traitement par la transplantation de la conjonctive du lapin. *Rec. d'ophthal.*, April, 1882.

4. REICH. On pemphigus of the conjunctiva. *Wratsch*, No. 19; *Centralbl. f. pract. Augenheilk.*, 1882, p. 145.

5. STOCQUART. Note sur l'emploi de l'acide borique dans les affections externes de l'œil. *Ann. d'ocul.*, vol. lxxxvii, May, June, 1882, p. 221.

HOTZ (1) reports a case in which calomel was dusted into an eye affected with recent rheumatic iritis, producing severe chemosis of the conjunctiva and cauterizing it where it came in contact with it.

ROCKLIFFE (2) observed lachrymation, photophobia, pain and swelling of the lids in a workman whose eye had been exposed to an electric light of 3,000 candlepower. All of these symptoms developed in the course of fifteen minutes.

FITZGERALD.

GALEZOWSKI (3) mentions a case of xerosis of the conjunctiva, in which both lower lids were united throughout their whole extent to the conjunctiva of the globe to within 2 mm. of the corneal margin. The left lower lid was detached and a conjunctival flap transplanted from a rabbit. The result was satisfactory.

MARCKWORT.

REICH (4) is of the opinion that those cases which are generally described as essential xerosis of the conjunctiva and degenerative syndesmitis, are probably the result of a more or less severe pemphigus of the conjunctiva, in which the affection of the skin was overlooked in the anamnesis.

HIRSCHMANN.

STOCQUART (5) reports 3 cases of blepharitis ciliaris, 7 of conjunctival catarrh, 14 of phlyctænar, and 2 of purulent conjunctivitis, all of which were successfully treated with preparations of boracic acid.

MARCKWORT.

1. HARDER. On the knowledge of pterygium. *Mitth. a. d. Königl. Univ.-Augenklinik zu München*, vol. i, p. 247.

2. v. REUSS. Pinguecula. *Eulenburg's Real.-Encyclop. f. d. ges. Med.*, vol. x, p. 652.

3. BURNETT. Circumscribed hypertrophy of the conjunctiva (vernal catarrh). These ARCHIVES, vol. x, p. 414. *Arch. f. Augenheilk.*, vol. xi, p. 391.

4. GOLDZIEHER. Lymphadenitis of the conjunctiva. *Centralbl. f. pract. Augenhk.*, 1882, p. 321.
5. V. MILLIGAN. A case of tuberculosis of the conjunctiva. *Centralbl. f. pract. Augenhk.*, July, 1882.
6. HORNER. Tuberculosis of the conjunctiva. *The diseases of the eye in childhood*, p. 317.
7. DIMMER. A case of angioma of the conjunctiva. *Prager med. Wochenschr.*, vol. vii, Nos. 33 and 34.
8. GRIFFITH. Epithelioma of the conjunctiva. *Ophth. Rev.*, vol. I, No. 9, 1882, p. 245.
9. STREATFIELD. A congenital anomaly of the conjunctiva hitherto unreported. *The Lancet*, vol. ii, No. 9, September 2, 1882.
10. CRITCHETT. A case of bony tumor of the conjunctiva. *The Lancet*, No. 20.
11. ROBINEAU. Quelques variétés de tumeurs malignes de la conjonctive. *Thèse de Paris*, 1882.

HARDER (1) anatomically examined two cases of pterygium. They showed the development of this anomaly, and furnished the anatomical substratum for Arlt's theory that pterygium is due to the superposition of the swollen conjunctiva over a fresh but healing erosion of the cornea. The loss of the epithelium of the cornea is a *conditio sine qua non*, as is proven by the condition of the fibrillar connective band between the lacunæ. The advance of the pterygium toward the centre of the cornea is not merely a passive one, as proliferation of the substance filling the corneal defect takes place.

BURNETT (3) discusses vernal catarrh. It attacks especially children, and consists in a grayish-yellow nodular swelling of the conjunctiva with a well-defined edge toward the cornea; the nodules may appear singly, or they may surround the whole limbus of the cornea. The remainder of the conjunctiva of the globe is thickened, and in whites of a yellowish-red, in negroes of a brownish color. Papillary excrescences of the tarsal part of the conjunctiva are also always found.

GOLDZIEHER (4) describes a case of lymphadenitis of the conjunctiva. In a boy of fourteen he removed a tumor the size of a hazel-nut from the fornix of the lower lid. It proved to be a conglomeration of lymphatic glands, which probably had developed from glandular follicles.

V. MILLIGAN (5) observed upon the conjunctiva of the lower lid a granulating excrescence the size of a pea, soft, of a light red color, and bleeding easily when touched, and attached to the conjunctiva by a thin pedicle. It was abscised, and proved to be a granuloma. Eleven months later several similar excrescences had developed which were removed with a sharp spoon.

HORNER (6) believes tuberculosis of the conjunctiva to be but one manifestation of a co-existent and similar affection of the lymphatic system of the same side. It is generally found upon the conjunctiva of the lids, rarely of the globe. The lid appears thickened; the conjunctiva is converted into a grayish-red, uneven, granulating mass. The disease always lasts a long time; decay slowly proceeds, while new granulations spring up; marginal ulcers and pannus of the cornea

may finally develop. The prognosis is not always bad ; sometimes the disease gradually disappears, leaving but a few scars.

DIMMER (7) describes a dark red tumor, which extended from the limbus of the conjunctiva downward to the retrotarsal fold, on the nasal side to the semilunar fold, and on the temporal side to the middle between limbus and outer commissure. At this point it became so prominent that the lids, when closed, did not cover it completely. It was but loosely attached to the sclera, and did not interfere with the movements of the globe in the least. The tumor contained many fascicles, had a smooth, shining surface, felt soft, and could easily be compressed by the finger, but at once reappeared when it was removed. The tumor was ligated twice, when it gradually disappeared.

GRIFFITH (8) saw a grayish tumor which occupied the upper part of the conjunctiva and cornea. The eye was enucleated and the tumor found to be an epithelioma extending to the optic nerve.

STREATFEILD (9) describes an anomaly of the conjunctiva hitherto unrecorded, which extended in form of a horizontal ridge from the outer canthus to the corneal margin.

NETTLESHIP.

1. HORNER. Keratitis interstitialis profunda. *The diseases of the eye in childhood*, p. 320.

2. MOOREN. *Five lustra of ophthalmological practice*, p. 109.

3. AGUILAR BLANCH. Contribution à l' étude de la k ratite interstitielle. *Rec. d' ophth.*, 1882,, vol. iii, No. 8, p. 457.

4. CARRE. Traitement des k ratites. *Gaz. d' ophth.*, March, April, 1882.

5. ROBIN. De la k ratite phlyct nulaire marginale. *Th se de Paris*, 1882.

6. DENTI. Di un singulare fenomeno pathologico di circolazione della cornea. *Gaz. del ospitale*, No. 22, Mar., 1882.

According to HORNER (1), diffuse interstitial keratitis (keratitis parenchymatosa, profunda, scrofulosa, syphilitica) occurs especially in children between the ages of five and sixteen. A grayish opacity spreads over the cornea, advancing from the periphery toward the centre, and becoming more and more dense. As the centre becomes opaque the periphery begins to clear up. As a rule, both eyes become affected, though not simultaneously, but at an interval varying from days to months. The disease always lasts a long time. Even in those cases which end well slight opacities of the cornea remain behind. The macroscopic changes alone of the cornea necessarily lead to the conclusion of a constitutional origin of the disease. While Mackenzie and Arlt designate just this form as scrofulous keratitis, Hutchinson has shown its connection with hereditary syphilis.

MOOREN (2) believes that interstitial keratitis is almost solely due to syphilis, and occurs in combination with the deformity of the teeth described by Hutchinson, although the latter is sometimes seen in non-syphilitic persons. The disease generally makes its appearance in childhood, though Mooren has also seen it in a number of persons of advanced age.

AGUILAR BLANCH (3) publishes a discussion of interstitial keratitis, mainly theoretically.

MARCKWORT.

According to an observation of DENTI (6), severe supra-orbital neuralgia and pericorneal injection developed in a person of forty-two suffering from specific iritis and numerous synechiæ, whenever the eyes were strained by reading or writing; at the same time a blood-red spot the size of a millet seed developed in the corneal tissue, 3 mm. from its edge; it was completely isolated and separated from the limbus of the conjunctiva by an opaque but non-vascular portion of cornea. After a few minutes' rest a fine red thread was seen to extend from the spot to the corneal margin, through which the blood seemed to disappear in the course of two minutes, leaving a dark gray opacity. The whole phenomenon could be produced at will. All the symptoms disappeared after energetic anti-syphilitic treatment of eleven days; the neuralgia became less severe; after the first few days a milk-white spot appeared instead of the red, and finally the whole opacity cleared up. The author explains the phenomenon by supposing that blood, and later white blood-corpuscles were forced into the corneal lacunæ by increased intra-ocular pressure.

DANTONE.

1. BARAQUER. Treatment of corneal ulcers. *Gas. mdd. Catalana*, Mar., 1882.
2. DORMAGEN. A case of rodent corneal ulcer. *Inaug. Diss., Bonn*, 1882.
3. VERDESE, ANGE. Contribution à la thérapeutique de l'ulcère serpiginoux de la cornée. *Arch. d'ophth.*, vol. ii, No. 2.
4. SIKORA. Étude clinique sur le traitement des ulcères rongeantes de la cornée. *Thèse de Paris*, 1882.
5. CARRE. De la cautérisation ignée de la cornée et de ses indications. *Gas. d'ophth.*, 1882, No. 7.
6. MOOREN. *Five lustra of ophthalmological practice*, p. 105.
7. REINHARDT. Tension in the anterior chamber, and loss of substance of the cornea under atropine and eserine. *Inaug. Diss., Basel*, 1881.

In conjunctival affections BARAQUER (1) performs peritomy in order to prevent any participation of the cornea; it also prevents chemosis and pressure upon the cornea. He cures corneal ulcers by a boracic-acid bandage, and instillation of eserine.

According to ANGE VERDESE (3) the serpent ulcer is of a septic character. Any obstruction of the lachrymal passages may lead to it, as the septic substances are not washed away, or may make their way from the mouth and nose to the eye. Simple epiphora may macerate the epithelium and so lead to the formation of a serpent ulcer. Ange Verdesse scrapes out the fundus and infiltrated edge of the ulcer and washes it with boracic-salicylic acid.

V. MITTELSTADT.

CARRE (5) cauterizes serpent ulcers.

In the forms of keratitis accompanied by hypopyon, MOOREN (6) practises splitting of the cornea according to Saemisch, with good results, besides applying a compressive bandage. Before the operation he cleanses the conjunctival sac several times with a dilute solution of salicylic or boracic acid.

1. WEINBERG. Quelques considérations sur les corps étrangers de la surface du globe oculaire. *Rec. d'ophth.*, May, 1882.
2. DUJARDIN. Des exsudats albuminoïdes à la suite des brûlures superficielles de la cornée. *Rec. d'ophth.*, April, 1882.

3. MAGNUS, H. A splinter of glass borne two years and three months in the cornea of the left eye. *Klin. Monatsbl. f. A.*, vol. xx, p. 396.

In discussing the foreign bodies of the cornea and conjunctiva, WEINBERG (1) reports a case in which, in consequence of lead-poisoning, lead had been deposited in the substance of the cornea. MARCKWORT.

Sometimes exudations result from superficial burns of the cornea, which, according to DUJARDIN'S (2) experience, can be easily removed by massage, or, if left to themselves, by the action of the lids.

MAGNUS (3) removed from the cornea of a lady a splinter of glass 2 mm. long which had been lying between the lamellæ for two years and a quarter.

1. GAMA, PINTO DA. Anatomical examination of an eye operated for corneal staphyloma according to Critchett's method. *Arch. f. Ophth.*, vol. xxviii, 1, p. 187.

2. BALLERTI. Du staphylome pellucide et son traitement. *Prog. méd.*, Mar. 10, 1882, No. 10.

3. BENSON. Anterior staphyloma of the eyeball. *Dubl. Jour. Med. Sci.*, July, 1882, p. 78.

4. HIGGINS. On eight cases of conical cornea treated by elliptical excision. *Ophth. Hosp. Rep.*, vol. x, p. 316.

5. HORNER. Keratoglobus. *The diseases of the eye in childhood*, p. 339.

GAMA (1) made an anatomical examination of an eye which was enucleated for cyclitis sixteen years after Critchett's staphyloma operation. The conclusion must be drawn that Critchett's operation is not entirely without danger.

HIGGINS (4) excised an elliptical piece from the cornea in eight cases of keratoconus with satisfactory results. FITZGERALD.

HORNER (5) describes that form of keratoglobus as pure whose sharply defined boundary and absolute transparency have been determined by several observers. Later in life it may become important only by a change in the refraction and disposition to cataract. In pellucid keratoglobus the cornea appears hazy, the globe is very hard, the pupil of normal size and almost immovable. Eserine generally causes a temporary disappearance of the opacity. If an eye affected with turbid keratoglobus is left to its fate, the opacity comes and goes at varying intervals. The cornea constantly grows, the whole anterior segment of the globe is pushed forward by the distension of the pericorneal scleral zone. At the same time the excavation of the disc due to the increased tension becomes more and more apparent. The whole picture of turbid keratoglobus is that of glaucoma; the whole process may be set down as congenital glaucoma.

1. MOOREN. *Five lustra of ophthalmological practice*, p. 114.

2. ANDREWS. Gummous tumor of the sclera. *These ARCHIVES*, vol. xi, p. 458. *Arch. f. Augenheilk.*, vol. xii, p. 113.

3. V. REUSS. Scleritis. *Eulenburg's Real.-Encycl. d. ges. Med.*, vol. xii, p. 558.

4. KLEIN. Massage in ophthalmology. *Wiener med. Presse*, 1882, Nos. 10, 11, 12, and 15.

5. CARRE. Du massage de l'œil. *Gas. d'ophth.*, No. 9, 1882.

MOOREN (1) found that far more women than men are affected with episcleritis. It is generally due to rheumatism and gout, but sometimes it is a complication of scleroderma, menstrual disturbances, and scrofula.

ANDREWS (2) saw a gummous tumor originating in the sclera, which disappeared under anti-syphilitic treatment.

KLEIN (4) employed massage of the eye in two cases of episcleritis—one of parenchymatous, and one of phlyctenular keratitis; Carré, besides in these diseases, in blepharitis ciliaris also.

1. LANDESBURG. A chip of iron ten years in the aqueous humor. *Klin. Monatsbl. f. A.*, vol. xx, p. 320.

2. SANTOS FERNANDEZ. Foreign body in the anterior chamber. *Cronica oftalmologica*, May, 1883.

3. HOLMES. An eyelash in the anterior chamber. These ARCHIVES, vol. x, p. 422. *Arch. f. Augenheilk.*, vol. xii, p. 90.

4. WILLIAMSON. Eyelashes in the anterior chamber of the eye, the result of a shot. *Lancet*, No. 12.

5. ATKEN. Large quantity of cholesterine crystals in the anterior chamber. *British Med. Jour.*, Feb. 4, 1882.

By a careful paracentesis of the anterior chamber, LANDESBURG (1) removed a chip of iron $\frac{1}{4}$ ''' long, which had remained there for ten years without materially injuring sight.

SANTOS FERNANDEZ (2) mentions three cases of foreign bodies in the anterior chamber. In the first they consisted of three particles of stone, in the second a chip of iron, and in the third a particle of molten iron. In the first two cases the foreign bodies were removed by keratotomy combined with iridectomy, in the third by keratotomy alone.

HOLMES (3) and WILLIAMSON (4) extracted eyelashes from the anterior chamber. In Holmes' case the eyelash had caused traumatic cataract.

ATKEN (5) saw a large number of cholesterine crystals in the aqueous humor.

C.—IRIS AND UVEAL TRACT, GLAUCOMA, SYMPATHETIC OPHTHALMIA, REFRACTIVE MEDIA (LENS AND VITREOUS BODY), RETINA AND FUNCTIONAL DISTURBANCES, OPTIC NERVE, INJURIES, FOREIGN BODIES (PARASITES), OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

By DR. A. NIEDEN.

I a.—IRIS.

1. ARLT. Case of tuberculosis of the iris. *Wiener. Med. Bl.*, No. 24, and *Sitz.-Ber. d. Ges. d. Aerzte*, p. 750.

2. BENSON, ARTHUR. Irideremia. Path. Soc. of Dublin. *British Med. Journ.*, May 6, 1882, p. 663.

3. BRAILEY and EDMUNDS. On a case of tuberculous disease of the iris. *Transact. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 269, 1882.
4. CARAFI, J. M. Monstre anencéphalique, présentant plusieurs vices de conformation. Colobome de la paupière inférieure et de l'iris à droite. *Soc. anat.*, séance de 23 Déc., 1881. *Le prog. méd.*, No. 32, 1882.
5. COME Y LANDA. Atresia pupilar considerable del ojo derecho, sintomática de una iritis parequimatosas. *Rev. espec. de oftalm.*, May, 1882. Cured by iridectomy.
6. EALES. Syphilitic iritis. *British Med. Journ.*, May 27, 1882.
7. EVERSBUCH, O. Contributions to the development of the serous cysts of the iris. *Mitth. aus d. Königl. Univ.-Augenkl. zu München*, vol. i, pp. 1-36. Will be reported in the next number.
8. FUCHS. Melanoma of the iris. *Arch. f. Augenheilk.*, vol. xi, p. 435. This number of the ARCHIVES.
9. HAAS, XAV. Report on 300 iridectomies performed in the Munich ophthalmic clinic, 1870-1880. *Mitth. aus d. Königl. Univ.-Augenkl. zu München*, vol. i, p. 72.
10. HOWE, LUC. Symptomatology of the pupil. ii, Pathological changes. *Buff. Med. Surg. Journ.*, vol. xxi, 11, p. 481. Nothing new.
11. MAYERHAUSEN. Contribution to the knowledge of albinism. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 191.
12. MOOREN. Case of pure gumma of the iris. 5 *Lustren ophth. Wirksamkeit*, p. 133. Wiesbaden: Bergmann.
13. MOOREN. On syphilitic iritis, *l. c.*, p. 140.
14. MOYNE. Scollamento dell'iride. *Boll. d' ocul.*, vol. v, No. 1, Sept., 1882.
15. MULES, P. H. Case of tubercle of iris, choroid, and retina. *Trans. of the Ophth. Soc. of the United Kingd.*, vol. ii, p. 265, 1882.
16. PONCET. Tuberculose primitive de l'iris et du corps vitré. *Soc. de Chir.*, séance, 14 Juin, 1882. *Union Med.*, No. 83.
17. RUMSCHEWITSCH (Kiew). Coloboma oculi, membrana pupillaris persistens, polycoria. *C. f. A.*, vol. vi, p. 138.
18. RUMSCHEWITSCH. Case of remnants of the embryonal pupillary membrane. *C. f. A.*, vol. vi, p. 142.
19. SWANZY. Primary tubercle of the iris. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 259.
20. ULLRICH. The anatomical changes in chronic inflammation of the iris. *Gräfe's Arch. f. Ophth.*, vol. xxviii, 2, p. 239.
21. WADE. Coloboma iridis. *Brit. Med. Journ.*, May 13, 1882, p. 703. Demonstration of a case at the Brit. Med. Assoc. at Birmingham.
22. WEINBERG. Kyste de l'iris. *Rec. d'ophth.*, vol. iii, 7, p. 439.
23. WOLFF, B. On tuberculosis of the iris. *C. f. A.*, vol. vi, p. 196.

In a girl of twelve, ARLT (1) saw the iris of the right eye densely covered with grayish, non-vascular nodules, presenting the characteristic appearance of

tubercles and filling the whole anterior chamber. Vision proportionately diminished. Examination of the lungs shows tuberculosis beyond a doubt. Hereditary predisposition.

PONCET (16) made a similar observation in a person of sixteen without any hereditary predisposition and with healthy lungs. No syphilis. Tuberculosis of the iris and anterior portion of the vitreous. The author thinks the latter is not rare, and agrees with Trelat and Perrin in advising the removal of an eye with tuberculosis of the iris, so long as other organs are not affected. An enucleation for tubercles of the choroid should only be performed when there is inflammatory reaction or danger of infection of the surrounding parts.

V. MITTELSTADT.

SWANZY (19) excised the eye of a girl two years old ; five months later the child was in good health. Marked tubercular family history. Microscope confirmed diagnosis. S. discusses the case with reference to the inoculation- or infection-theory.

FITZGERALD.

In an otherwise healthy girl of twenty, WOLFF (23) observed tubercles confined to the iris of the left eye (granuloma simplex). The microscope confirmed the diagnosis and showed giant-cells.

ULRICH (20). A series of investigations of portions of iris obtained by iridectomy showed that the essential feature of chronic inflammations of the iris is obliteration of the blood-vessels and fibrous hypertrophy, frequently combined with increased tension. In eleven out of twenty-four cases there was + T ; in ten of them the above conditions were found. In secondary glaucoma fibrous hypertrophy of the tissue of the iris was plainly marked, also where anterior synechiæ had existed for some length of time ; while in cases where they had existed but a short time, also in parenchymatous keratitis, only hyperæmia and cellular infiltration were noticeable.

WEINBERG (22) examined the left eye of a girl of twelve, the anterior chamber of which was more than half filled by a cyst of the iris. Excision was successfully performed. The walls of the tumor were found to consist of normal iris-tissue.

EALES (6) observed a patient in whom gummous nodules had formed rapidly on both irides, causing absolute glaucoma in one eye ; the other was recovering.

MOOREN (12) had an opportunity to examine microscopically a pure gumma of the iris in a young man of nineteen, in whom syphilitic antecedents could not be traced. He found, besides the characteristic structure, great masses of pigment in form of lumps, generally lying together in heaps, but not enclosed in cells.

Among two thousand and sixty-eight cases of iritis, the same author observed one hundred and sixty-nine of pure syphilitic iritis. If, after a regular iridectomy in chronic irido-choroiditis, symptoms of irritation are observed, which, combined with marked distension of the blood-vessels, threaten closure of the pupil, he would diagnose syphilis with certainty.

FUCHS (8) describes, in a woman of seventy, a case of melanoma of the iris which had developed without causing any marked symptoms. It consisted of cells only, which had begun to proliferate at the peripheric end of the cross-section

of the sphincter and appeared identical with the pigment-cells found under normal conditions in the iris, while in the melano-sarcomas there are always a few cells with large nuclei only slightly colored or not at all. The cells develop from the stroma-cells of the iris; the pigment-epithelium did not participate; they must, therefore, be distinguished from hyperplasia of the uveal portion.

MOYNE (14). Two cases of traumatic irido-dialysis in two boys twelve years old. The first healed by iridesis, with $V = 1$; in the other, the lens also was injured, but successfully extracted. Double vision was not found in either patient.

DANTONE.

BENSON (2) exhibited at the Pathological Society of Dublin the right eye of a boy æt. ten. Globe enlarged. Cornea clear. Lens subluxated and opaque, with here and there calcareous patches. Iris entirely absent, except a small sector above, which was adherent to lens capsule. Lesions probably due to intra-uterine irido-choroiditis. Iris of left eye normal.

FITZGERALD.

CARAFI (4) observed in an anencephalus, besides other formative anomalies, a fissure in the lower lid and iris of the right eye.

MAYERHAUSEN (11). In a case of albinism presenting no unusual features the author endeavors to explain this anomaly as a symptom of a general cachexia (leucopathy).

RUMSCHEWITSCH (17) observed a coloboma of the choroid in both eyes, which reached to the optic nerve, and was complicated with a pupillary membrane. In opposition to Deutschmann the author will only admit the theory of checked growth.

In describing a second case of remnants of the pupillary membrane the author opposes the view of Deutschmann, though the latter did not discuss its origin in his paper, on the development of the coloboma of the choroid as the result of inflammation.

I b.—CHOROID AND CILIARY BODY.

1. AYRES, W. Case of sarcoma of the choroid. These ARCHIVES, vol. x, p. 269. *Arch. f. Augenheilk.*, vol. xi, 3, p. 323.

2. BARRAQUER. Un cas de chorioidite tuberculeuse. *Rec. d'ophth.*, Aug., 1882. Clinical history and microscopic examination of the enucleated eye.

3. BRAILEY and LOBO (London). On pathological new-formations in the choroid. *C. f. A.*, vol. vi, p. 262.

4. DANESI. Un caso di sclero-corioidite anteriore con stafilomi terminato assai felicemente. *Boll. d'ocul.*, vol. iv, No. 8, April, 1882.

5. DUJARDIN. Irido-choroidite suppurée chez un enfant de neuf mois. *Journ. des soc. méd. de Lille*, April 5, 1882.

6. GRIFFITH, A. H. (Manchester). Sarcoma of the eyeball. *Brit. Med. Journ.*, April 8, 1882, p. 503. Demonstration of a case which had been communicated from the sclera to the choroid and had detached most of the latter.

7. MAYERHAUSEN. The etiology of hydrophthalmus. *C. f. A.*, vol. vi, p. 225.

8. MELÉ FARRÉ. Syphilitic choroiditis in both eyes. *Boll. del Ateneo de al. intern. del. facult. de med. de Barcelone*, Feb. 1882; *C. f. A.*, vol. vi, p. 183.

9. MOOREN. On disseminate and areolar choroiditis. *Five lustra of ophthalm. practice.* Wiesbaden: Bergmann, p. 157.

10. PAULSEN. The development of posterior staphyloma of the choroid. *Gräfe's Arch. f. Ophthalm.*, vol. xxviii, 1, p. 225.

11. REID, THOMAS. Melanotic sarcoma of the choroid. *Brit. Med. Journ.*, April 29, 1882, p. 615.

12. LE ROY. Melanosarcome de la choroïde. *Ann. de la soc. de m  d. d'Anvers*, May-June, 1882.

13. STORY. Melanotic sarcoma of the eyeball. *Brit. Med. Journ.*, April 15, 1882.

AYRES (1) observed a melano-sarcoma of traumatic origin. The microscope showed active proliferation of the cells by division, and considerable thickening of the walls of the blood-vessels, the latter probably the result of proliferation of the adventitia and the perivascular tissue of the blood-vessels.

BRAILEY and LOBO (3) found three peculiar conditions in neoplasms of the choroid: 1. A dense layer of connective tissue between the vascular parenchyma of the choroid and the lamina fusca, interspersed with some broad, cystoid cavities filled with blood, which are especially frequent in sympathetic choroiditis. 2. Some peculiar large bodies are described, springing from the inner surface of the choroid, of fibrillar or bony structure, and containing a central cavity filled with a granular, yellowish mass. Besides these there are larger structureless bodies, resembling colloid excrescences. 3. Formation of bone generally takes place on the inner surface of the choroid. The lamina vitrea does not participate; the bone is formed in the midst of the proliferating pigment-epithelium.

REID (11) exhibited sections of a tumor removed from a woman   t. forty-five. Six years ago she had complained of dimness of vision, due to detachment of the retina in lower half of fundus oculi; soon afterward vision was quite lost. Two years later she suffered from pain in the eye. Tumor was found occupying lower half of eyeball. Enucleation was performed, and a section showed a pigmented sarcoma springing from choroid and penetrating sclerotic.

FITZGERALD.

LE ROY (12). In this case also the sarcoma seemed to be of traumatic origin. Later a relapse occurred in the orbital tissue, making exenteration of the orbit necessary.

MARCKWORT.

STORY (13) describes a melano-sarcoma occupying the ciliary body and the anterior portion of the choroid at the upper and outer quadrant of the left globe. The patient,   t. thirty-three, had suffered from erysipelas over the left temple when three years of age, and had been struck with a twig in the eye six years ago.

FITZGERALD.

DANESI (4). Two scleral staphylomas, the size of a grain of wheat, developed in a highly myopic eye, with a peripheric adherent leucoma about 4 mm. upward and outward from the corneal margin, producing considerable irritation. Paracentesis proving useless, jaborandi and, later, iodide of potash were successfully employed, the staphylomas disappearing entirely, and leaving M — 5 D and V —   .

DANTONE.

The case of MAYERHAUSEN (7) was one of congenital hpdrophthalmus, whose further development coincided with the beginning of dentition; it gradually attained considerable dimensions, while at intervals inflammatory attacks of an exquisitely glaucomatous character set in, and finally led to nodular deposits on the anterior surface of the corneal epithelium. The size of the globe was reduced and vision improved by the use of eserine, as in an analogous case of Bergmeister (*Wien. med. Presse*, 1881, No. 30).

PAULSEN (10) tries to prove that the cause of posterior staphyloma of the choroid is the constant strain exerted by the optic nerve upon the globe when the latter moves. The lateral portion of the insertion of the sheath in the globe, the point of least resistance, is stretched by the movements of the globe, especially the myopic, producing detachment of the choroidal ring, and atrophy of the choroid, and finally dilatation of the part in question. The author tries to prove by the results of his investigations of seamen, who, while not called upon to accommodate, must see at a distance or upward, that neither accommodation nor convergence, as productive of pressure, nor yielding of the sclera, nor checked growth, exerts any influence upon the position of the choroidal staphyloma. He found staphyloma posticum in sixty per cent., though only 12.5 per cent. were myopic. The dilatation was downward in sixteen per cent., downward and outward in thirty-four per cent.

M. FARRE (8) treated a woman of forty-two, who had been infected by her baby, for syphilitic chorio-retinitis and extensive exudation into the vitreous. Vision, which had been $\frac{1}{2}$ was quickly and almost completely restored by inunction.

According to MOOREN (9) disseminate choroiditis is the peripheric, areolar choroiditis the central, localization of one and the same disease. The delicate opacities of the vitreous so frequent in the former cannot be considered characteristic of syphilis. This is only proven by the presence of chronic choroiditis. Secondary glaucoma is rare in this disease. Areolar choroiditis, especially in children, should arouse suspicion of hereditary syphilis.

II.—GLAUCOMA.

1. AGNEW, C. R., and WEBSTER, D. Cases of acute glaucoma. *N. Y. Med. Rec.*, Aug. 5, 1882.
2. ANGELUCCI. Alcune considerazioni sulla etiologia del glaucoma. *Quadri stat. e frammenti d' oftal.*, Roma, 1882.
3. BOUCHE. Du glaucome et de son traitement par la sclerotomie. *Thèse de Paris*, 1882.
4. BRAILEY. Size and position of the crystalline lens in glaucoma. *Roy. Lond. Ophth. Hosp. Rep.*, vol. x, 3, Aug., 1882, p. 372.
5. DRIVER, EUG. The symptomatology and treatment of acute glaucoma. *Inaug. Diss.* Berlin: Lange.
6. DA GAMA, PINTO. Anatomical examination of an eye operated according to Critchett's method for corneal staphyloma. *Gräfe's Arch. f. Ophth.*, vol. xxviii, 1, p. 176.
7. KENDALL. Glaucoma following dislocation of lens. *Brit. Med. Jour.*,

Aug. 26, 1882, p. 369. Dislocation of the lens into the anterior chamber, resulting from a blow upon the eye.

8. MAUTHNER. Secondary glaucoma. Second half or Nos. 10 and 11 of his monograph on glaucoma. Wiesbaden : Bergmann, 1882, pp. 117-292.

9. PARINAUD. Du glaucome, sa nature et son traitement. *Gaz. méd. de Paris*, 1882, 9 and 12.

10. PRIESTLEY-SMITH. Glaucoma following a blow on the eye. *Ophth. Rev.*, vol. i, No. 10, 1882, p. 273.

10 a. PRIESTLEY-SMITH. Spontaneous dislocation of the lens into the anterior chamber with secondary glaucoma. *Ophth. Rev.*, vol. i, June, 1882, p. 209. The periphery of the iris was driven forward to such an extent by the dislocated lens, that Fontana's canal was closed.

11. SCHNABEL. On glaucomatous affections. *Wien. med. Presse*, 22-26.

12. SIMI. Simptomatologia del glaucoma. *Lezioni di ottalmojatria*, Impartz, April, 1882. Continuation of lectures vi and vii. Symptomatology and pathogeny of glaucoma.

13. SNELL. On eserine and pilocarpine in glaucoma, and eserine in ocular neuralgia.

14. STELLWAG, v. CARION. On glaucoma. Discussions on practical ophthalmology, edited in conjunction with Prof. Wedl and Dr. Hempel. Vienna : Braumüller, 1882,

15. STREATFEILD. Mydriatics and glaucoma. *Brit. Med. Jour.*, July 29, 1882, p. 193.

16. TARTUFERI. Sul glaucoma emorragico e sull' occlusione del canale di Fontana nel glaucoma. *Giorn. d. R. Acad. de Med. di Torino*, Nos. 8, 9, 1882.

AGNEW and WEBSTER (1) report eleven cases of patients between the ages of thirty-five and seventy-five. In fifteen eyes iridectomy was performed, in one eye twice; the result was good in all cases except those complicated with hemorrhagic retinitis; in thirteen useful sight was preserved. BURNETT.

SCHNABEL (11). In twenty-five cases (forty-three eyes) of primary glaucoma the other eye was found healthy in only four; twenty-three of them were cases of glaucoma simplex, in which there was frequently no increase of tension, the excavation only assisting in making a diagnosis, though at times an increased tension was perceptible. The opacities of the cornea also cannot be ascribed to this, but must be considered only as a symptom of glaucoma. Iridectomy arrested the disease, but always diminished sight; forty-five cases of secondary glaucoma were observed. The author supports the theory of hypersecretion in some cases, where occlusion of Fontana's space cannot be thought of. Neither does he consider the choroiditis accompanying glaucoma to be of any influence upon the development of the disease.

As regards the etiology of glaucoma, ANGELUCCI (2) seeks its primary cause in the sclerosis of the arteries, giving rise to stasis in the veins and consecutive exudations into the venous walls. The closure of the perivascular lymph-ducts by the swollen veins is of greater consequence than the closure of Fontana's canal. DANTONE.

The general result of a series of observations made by BRAILEY (4) during the last two years, goes to show that the average size of the lens in glaucoma is below that accompanying other conditions—healthy or morbid. B. considers there is no proof that the lens offers any undue resistance in glaucoma to the passage of fluid through it, and he fails to recognize, in cases of primary glaucoma, any obstruction to the normal outflow of fluid at the anterior surface of the vitreous sufficient to advance the lens. He thinks that if obstruction be a cause, we must look for it in the vitreous itself.

FITZGERALD.

MAUTHNER (8) treats of secondary glaucoma in the same masterly manner as of primary glaucoma, although his attempt to overthrow the old theories of glaucoma and establish his own, according to which it is an atrophic degeneration of the parts in question, due to inflammation of the ciliary blood-vessels, gives it a marked polemic character.

PRIESTLEY-SMITH (10) has come to the conclusion that in every case of increased tension, the escape of fluid from the eye is obstructed one way or other. He then reports the case of a woman who received a violent blow on the right eye from the cork of a soda-water bottle; acute glaucomatous symptoms subsequently ensued, and the eyeball was removed. The iris was found to have been drawn forward and its periphery pressed against the cornea by the processes in consequence of the increased size of the senile lens. This close proximity between the processes and the lens he considers the predisposing factor in the initiation of glaucoma. He suggests it as likely that when the processes are greatly swollen and pressed against the iris (and lens), they may unload themselves in a disproportionate amount through their vitreous surface, and the return of the fluid from the vitreous to the aqueous chamber being checked by the compression of the circumlental space, an edema of the vitreous may be set up.

FITZGERALD.

In the chapter on glaucoma, STELLWAG (14) again tries to explain the increased tension by his mechanical theory, the disease occurring only when the sclera is stiff, rigid, and unelastic; while Wedl, basing his opinion on the anatomical examination of glaucomatous eyes, assigns an important influence to the vaso-motor nerves.

DA GAMA, PINTO (6) found that the glaucomatous excavation of the optic nerve was filled with connective tissue consisting of thick bands interspersed with numerous nuclei.

TARTUFERI (16) believes that closure of Fontana's canal precedes sclerosis of the ciliary body. As the latter process advances the meshes of the canal become smaller and smaller, until at last the peripheric portions of the iris and cornea unite. This agglutination cannot be demonstrated in all eyes, and is also observed in non-glaucomatous eyes. The effect of the partial or total closure of the canal upon the glaucomatous process cannot, therefore, be fully decided.

DANTONE.

SNELL (13) is satisfied that eserine is of use not only in acute but also in chronic glaucoma. Its action is not so certain in the latter, but still it sometimes not only produces an improvement in the vision but also arrests the progress of the disease. He records a case of acute glaucoma where iridectomy was declined, and not having any eserine at hand, he ordered pilocarpine

"discs." The same evening the patient was much relieved of pain, and a few days later the attack passed off. He has found eserine of great use in cases of ocular neuralgia unattended with increased ocular tension. FITZGERALD.

To avoid the danger attending the use of atropine in eyes with a tendency to glaucoma, STREATFEILD (15) proposes the introduction into the *British Pharmacopæia* of a much weaker solution in addition to the present one. He believes the present scare about the artificial production of glaucoma by use of mydriatics to be much exaggerated, but it ought to be better known that a very weak solution suffices for the production of mydriasis. FITZGERALD.

III.—SYMPATHETIC OPHTHALMIA.

1. AYRES, W. Contributions to the pathology of sympathetic ophthalmia. These ARCHIVES, vol. x, p. 277. *Arch. f. Augenheilk.*, vol. xi, 3, p. 330.

2. CRITCHETT, A. On a case of sympathetic ophthalmia. *Ophth. Hos. Rep.*, vol. x, August, 1882, p. 322.

3. DEUTSCHMANN. Experiments on the pathogeny of sympathetic ophthalmia. *v. Gräfe's Arch. f. Ophth.*, vol. xxvii, 2, p. 291.

4. FROST, W. A. Sympathetic ophthalmia appearing after enucleation of the injured eye. *Trans. Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 21, 1882. *Lancet*, No. 20.

5. GASTALDO, JOSÉ. Luxation traumatique du cristallin dans le corps vitré, passage de la lentille dans la chambre antérieure, symptômes d'ophtalmie sympathique; extraction partielle; guérison. *Rev. d'ocul. du sud-ouest*, vol. ii, No. 5, p. 106. *La cronica oftalmica*.

6. GONELLA. Contribuzione alla neurotomia ottico-ciliare. *Giorn. del R. Acad. di Med. di Torino*, 8-9, 1882.

7. MILLES. Sympathetic ophthalmia following extraction of cataract. *Ophth. Hosp. Rep.*, vol. x, 3, August, 1882, p. 325.

8. MOOREN. On the transmission of sympathetic affections. *Five lustra of ophthalm. practice*. Wiesbaden: Bergmann, 1882, p. 143.

9. SNELL. Mercury in sympathetic ophthalmia. Praises mercurial treatment. *Brit. Med. Journ.*, May 27, 1882, p. 796.

10. SNELL, S. Sympathetic iritis (?) occurring thirty-two days after enucleation of eye for accident. *Trans. Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 19, 1882.

11. THOMPSON, W. Four cases of traumatic sympathetic ophthalmia. *Med. and Surg. Rep.*, Feb. 11, 1882.

Eleven cases are reported by Mr. MILLES (7), senior house-surgeon, Royal London Ophthalmic Hospital. The patients were five men and six women, the average age being sixty-five. Gräfe's modified linear extraction was performed in each case. In six cases the operation was uncomplicated. In two some soft cortex was left behind. In one the iris was partially torn from its attachment. In one the lens was removed with a scoop, with slight loss of vitreous. Notes lost in one case. Iritis, more or less severe, occurred in six cases. In two there was a slight incarceration of the iris in the corners of

the wound, and in two the iris and capsule were adherent in it. The interval between extraction and the onset of the sympathetic attack was, as a rule, two or three months. Keratitis punctata present in nearly all the cases. T variable.

FITZGERALD.

After accurately describing four cases, THOMPSON (11) classifies the symptoms of sympathetic ophthalmia as follows: (1) Those in the anterior portion of the globe as hyperæsthesia of the region of the ciliary body, especially its upper part, gradual diminution of the breadth of accommodation and premature presbyopia, iritis and its consequences. (2) In the posterior portion hyperæmia of the optic nerve, neuritis, neuro-retinitis, retino-choroiditis, and hyalitis. The author believes in transmission through the optic nerve as well as by reflex action of the ciliary nerves.

BURNETT.

CRITCHETT (2). A man received a gunshot wound in the right eye in the ciliary region. Palliative treatment at provincial hospital for a fortnight, then admitted into St. Mary's Hospital under Mr. Anderson Critchett. O S appeared to be perfectly healthy and V normal. O D enucleated. Patient discharged six days afterward with caution regarding use of O S. Fifteen days later, exactly one month after injury, noticed slight indistinctness of vision which gradually increased. Eye became red and painful. About five months later was re-admitted to hospital. Well-marked sympathetic ophthalmia, with + T_g. Iridectomy performed with improvement of V. C. refers to opinion which was held by ophthalmologists up to a recent period, namely, that when an injured globe was removed before any evidence of irritation could be noticed in the other eye, complete freedom from sympathetic ophthalmia might be confidently predicted. This doctrine, as he remarks, has received a rude shock from the recent observations of Mr. Nettleship. The practical inference is, that a short delay may be fraught with danger, and that an emphatic decision should, if possible, be at once arrived at as to the necessity which exists for removal of the injured eye.

FITZGERALD.

SNELL (10). Man twenty-six years old. Excision of left eye eight weeks after injury. Globe, which was shrinking, found to contain fragment of steel adherent to ciliary body. Right eye had shown "merely symptoms of irritation," but a week or so after excision patient complained of "a mist." No neuroretinitis, and three weeks after operation pupil dilated by atropine, but two weeks later instillation of eserine was immediately followed by great pain and severe plastic iritis. Complete recovery after treatment by atropine and mercury, patient reading J. 1.

FITZGERALD.

FROST (4). Girl of nine, received wound in ciliary region of left eye from a stone. Excision thirty-four days later, globe being soft and somewhat tender and without perception of light. Dimness of right eye first noticed twenty-two days afterward, and when seen eight days later there was keratitis punctata, with pupil active but dilating imperfectly by atropine. No synechiæ, nor conjunctival injection. Fundus normal, V — $\frac{2}{3}$ and J. 1; two months later recovery was perfect. No neuritis could at any time be detected.

(Both of these cases are open to criticism.—REV.)

FITZGERALD.

AYRES (1) found in eight cases, in four of which sympathetic ophthalmia had developed in the other eye, irregularities in the form and appearance of the

fibres of the ciliary nerves, especially as regards the form and number of the nuclei of the interfibrillar connective tissue. The ciliary nerves were frequently found widened to three times their normal extent, and the fibres filled with a row of strongly reflecting globules (myeline) resembling a string of pearls. The author is inclined to assume two methods of transmission of the sympathetic irritation, one through the optic nerve and the other through the ciliary nerves. The former is probable in cases of more rapid transmission, 15-20 days; the latter in cases of slow development. A case of sympathetic neuro-retinitis is reported, eighteen days after the injury of the first eye.

DEUTSCHMANN (3) proved by injections of spores of asperg. glauc. into the optic nerve in nine cases and into the vitreous in three cases, that not only papillitis and inflammation of the injected eye ensued, but also that in eight of these twelve cases there were plain and characteristic indications of transmission to the papilla and surroundings of the optic nerve of the other eye, by way of the optic nerve and its sheaths, the chiasm, and the optic nerve of the other side; besides which there was an infiltration of the anterior portion of the pia mater at the base of the brain. Papillitis and perineuritis generally ensued after seven or eight days, lasted for a few days, and then disappeared without leaving a trace. These experiments are an important step forward in the recognition of the nature of sympathetic ophthalmia, even though it was not possible to fully develop the disease in the second eye.

MOOREN (8) believes that the sympathetic irritation is transmitted through the ciliary nerves and optic nerve, especially through the agency of the vasomotor system. No definite date for the time of its beginning can be given, though the inflammation may set in before the time generally accepted, *i. e.*, the fifth week. In only three cases did Mooren see sympathetic neuritis or neuro-retinitis resp. develop after timely enucleation.

In regard to treatment, GONELLA (6) is opposed to neurotomy. The results of thirteen operations performed by Raymond were very poor. In three cases painfulness continued after the operation; in three it was less, but in two of them it returned after a short time with the former intensity. In seven the painfulness disappeared, though for three of them for only three to nine months; three patients failed to appear again; and in only one no pain was manifested by pressure on the globe after the lapse of a year. The cornea did not become anæsthetic at all, or at least only immediately after the operation. DANTONÆ.

IV.—REFRACTIVE MEDIA.

a.—LENS.

1. ABADIE. De certaines complications consécutives à l'opération de la cataracte et des moyens d'y remédier. *Ann. d'ocul.*, Sept.-Oct., 1882.

2. ANGELUCCI. Lussatione del cristallino dell'occhio destro; miopia consecutiva; contribuzione al dottrinale dell'accomodazione. *Quadri statist. e frammenti d'oftalm.*, Rome, 1882. Subluxation of the lens and consecutive myopia of 6 D produced by an injury in a young man of twenty-two.

3. ARMAIGNAC. Cataracte capsulo-lenticulaire survenue rapidement chez un jeune homme à la suite d'une irido-choroïdite; opération; guérison rapide. *Rec. d'ocul. du sud-ouest*, Feb., 1882.

4. AUSSET. Du traitement de la cataracte molle par la méthode de l'aspiration. *Thèse de Paris*. Nothing new.
5. AYRES, W. C. Gliomatous infiltration of the lens. These ARCHIVES, vol. x, p. 273. *Arch. f. Augenheilk.*, vol. xi, 3, p. 327, with an illustration.
6. AYRES, W. C. On the new-formation of bone in the lens-capsule. These ARCHIVES, vol. x, p. 275. *Arch. f. Augenheilk.*, vol. xi, 3, p. 327.
7. BECKER. The anatomy of the healthy and diseased lens. *C. f. A.*, vol. vi, p. 129.
8. DICKINSON. Congenital cataract. *St. Louis Med. and Surg. Journal*, vol. xliii, 1, p. 53.
9. GAYET. Distribution de la cataracte dans la région Lyonnaise, Assoc. franc. pour l'avancement des sciences. Sess. de 1882 à la Rochelle. *Progr. med.*, Sept., 1882; *Gas. d'ophth.*, vol. x, 1882.
10. HIRSCHBERG. Anat. and pract. remarks on the extraction of senile cataract, artificial pupil and tattooing of the cornea. *v. Graef's Archiv f. Ophth.*, vol. xxviii, 1, p. 245.
11. HODGES. Preliminary iridectomy in extraction of cataract. *Brit. Med. Journ.*, Sept. 2, 1882, p. 424.
12. MAZZA. Pietrificazione, degenerazione calcarea, della lente cristallina (calcareous degeneration of the lens). Genoa, 1882.
13. PRIESTLEY-SMITH. Spontaneous dislocation of the lens into the anterior chamber with secondary glaucoma. *Ophth. Rev.*, vol. i, June, 1882, p. 209. Cfr. rep. under glaucoma.
14. PROUET, J. M. Trois observations de cataracte zonulaire. *Rev. d'ocul. du sud-ouest*, No. 8, p. 172.
15. RAMPOLDI. Sublussazione traumatica della lente cristallina—miopia acuta di 4.5 D. Abolizione della camera anteriore. Traumatic subluxation of the lens, M = 4.5 D, loss of anterior chamber. *Osserv. ottalm. Ann. Univers. di Med.*, No. 261, 1882.
16. SCHMEIDLER. Cataract operations at the clinic of v. Arlt from 1874 to 1881. *Wien. med. Wochenschr.*, Nos. 16-18,
17. ULRICH. Rupture of the lens-capsule. *Klin. Monatsbl. f. Augenheilk.*, July, 1882, p. 230.
18. WICHERKIEWICZ. A rare manner of healing of an iridectomy for glaucoma, with some remarks on traumatic opacities of the lens. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 181.

Based on his investigations BECKER (7) makes the following assertions: (1) direct participation plays an important part in the embryological growth of the epithelium of the anterior part of the capsule. The proliferation of the cells takes place in various spots over the whole inner surface of the anterior part of the capsule. The anterior capsule is generally thicker than the posterior. Capsular cataract is the result of proliferation of single cells lying nearer the anterior pole. Outside of the capsular epithelium are found hyaline deposits upon the capsule (Müller's hyaline membrane); membranous congenital cataract is similarly formed. The large swollen cells found in every senile cataract

develop directly from the epithelial cells of the anterior capsule ; sometimes the inner surface of the posterior capsule is covered with cells resembling epithelium, from the nuclei of which these swollen cells develop. Chalk is deposited in capsular cataract in the lacunæ of the tissue around the degenerating cells. In soft cataract of young persons there is generally no intracapsular proliferation.

HIRSCHBERG (10) describes his method of treatment in extractions and other operations ; the most scrupulous cleanliness is observed, but the strict antiseptic method is not followed. He reports the anatomical examination of four eyes operated for cataract : No. 1, the result of a normal extraction according to Graefe ; No. 2, a phthisical globe containing a considerable quantity of cortex with the capsule of the lens healed into the scar ; No. 3, an attempted extraction, the whole lens remaining behind ; No. 4, total phthisis after extraction. He also gives a microscopical description of a case of tattooed corneal staphyloma combined with an iridectomy. See the original.

ULRICH (17) reports a case of rupture of the capsule of the lens, probably caused by the strain of iritic membranes. The lens was dislocated into the anterior chamber, whence it was extracted. In an old woman, in whom an upward iridectomy had been performed for glaucoma ($T = + 3$), and in whom an apparently slight dislocation of the lens had taken place, WICKERKIEWICZ (18) found that the nucleus was spontaneously dislocated beneath the bandage under the conjunctiva. The course of healing was normal ; according to the author an intracapsular regeneration of the lens-fibres probably took place (?).

In regard to the distribution of cataract in the neighborhood of Lyons, GAYET (9) reports that they occur in about the ratio of 2 : 1000. They are less frequent in women than in men. Senile cataract develops in the latter at forty-four, in the former at forty-nine. Cataract is more common, more than 3 : 1000, where glass-blowing and metallurgy is carried on, a fact which he ascribes to the radiating heat. The number of peasants with cataract is comparatively large.

AYRES (5) found in a glioma of the retina (cfr. *Archiv. f. Augenheilk.*, vol. x, p. 325) that the glioma-cells extended on one side of the ciliary body, canalis Petiti, along the whole length of the suspensory ligament to the lens-capsule, had penetrated the latter, and entered the lens itself.

The same writer (6) found in a case of new formation of bone in the lens-capsule, that the cortex had entirely disappeared, and had been replaced by bony tissue. Ossification began in the layers of the lens parallel to the stratum of connective tissue near the capsule. The latter had about its normal convexity.

In November, 1880, ABADIE (1) was so unfortunate as to lose four cataracts in succession by suppuration. He seeks the cause in mycotic infection, emanating from fungi which appeared on the walls and ceiling of the new clinic. In treating beginning suppuration, the author again opens the wound, empties the anterior chamber, and cleanses with boracic acid, and repeats this as necessity demands. Besides this spray of boracic acid every fifteen minutes, every four hours eserine, in very bad cases cauterization of the corneal wound with a glowing platinum wire.

MARCKWORT.

For the last six years HODGES (11) always performs preliminary iridectomy before extraction, is very well satisfied with the results, and considers its chief advantages to be the freedom of the anterior chamber from blood after extraction, and the information obtained by the operator as to how the patient bears narcosis.

SCHMEIDLER (16) has prepared the statistics of the cataract operations performed at the clinic of v. Arlt from 1874 to 1881. 1,547 peripheric extractions were performed in 1,460 persons. Good results were obtained in 91.2 %, dubious in 6.44 %, and loss in 2 %. The statistics of the accidents and incidents of the operations and of the course of healing are very interesting.

b.—VITREOUS BODY.

1. ALEXANDER. Left-sided blindness by thrombo-phlebitis, resulting from right-sided suppuration of the vitreous. *Deutsche med. Wochenschr.*, No. 34, 1882.

2. DEUTSCHMANN. On genuine tuberculosis of the vitreous in man.

3. DIMMER. The diagnosis of detachment of the vitreous. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 259.

4. LITTLE. Persistent hyaloid artery. *Ophth. Rev.*, July, 1882.

5. MOOREN. On hyalitis. *Five lustra of ophthalmological practice.* Wiesbaden, Bergmann, 1882, p. 192.

6. SWANZY. Detachment of the vitreous humor. *Ophth. Soc. of the Unit. Kingd., The Lancet*, No. 20, 1882.

ALEXANDER (1). A young man of twenty-two, otherwise perfectly healthy, had an adherent leucoma since childhood, probably also a cystoid scar of the right eye. Suddenly acute suppuration, combined with violent pain, began in this eye, though not preceded by any inflammation, and followed in a few hours by dimness of sight of the left eye, which constantly increased, and in four days terminated in complete blindness. Doubtless mycotic infection of the vitreous of the right eye had taken place, producing thrombo-phlebitis in the veins of the optic nerve of the other eye, which was followed by retrobulbar neuritis rapidly terminating in atrophy.

DEUTSCHMANN (2) frequently found pure tuberculosis of the vitreous in rabbits, without any of the choroid and retina after injection of tuberculous matter. The author also found, in a case of amaurosis of a man due to iridochoroiditis, by microscopic examination, that it had been preceded by localized tuberculosis of the vitreous, the other membranes of the eye not being affected.

DIMMER (3) observed two cases of detachment of the vitreous. Once, after an extraction, in which there was a slight loss of vitreous. At first V. was good, but later the semblance of detachment of the retina downward and outward developed. There was, however, no detachment of the retina, as the course of the blood-vessels underneath showed that there must be detachment of the vitreous. The blood-vessels appeared bent at the margin of the detached portion. The cause must probably be sought in shrinkage of the vitreous, followed by serous transudation between the retina and vitreous. The second case was one of irido-cyclitis, which had come to an end leaving numer-

ous posterior synechiæ, in which the same occurrences were observed after repeated iridectomies.

LITTLE (4) saw a rare case in which two blood-vessels wound in spirals about each other, started from the papilla in both eyes, and attached themselves to the posterior pole of the lens, where they formed a closed loop.

MOOREN (5) is inclined to seek the final cause of inflammation of the vitreous in infection. In four cases he saw abscesses of the vitreous after a normal extraction. Division of the membranes in the vitreous scarcely ever produced a good result. The author frequently saw opacities form in the vitreous after inflammation of Tenon's capsule.

V.—RETINA AND FUNCTIONAL DISTURBANCES.

1. ABADIE, CH. Considérations nouvelles sur la rétinite dite albuminurique. *Union méd. de Paris*, Oct. 15, 1882.
2. ABBOT, F. W. The deliverances of the retina. *Buff. Med. and Surg. Journ.*, April, 1882.
3. ADAMÜCK. On detachment of the retina. *Aerzt. Zeitung*, 1882, Nos. 13-15. (Answer to an article of Denissenko.)
4. AGNEW. Glioma of the retina. *N. Y. Med. Jour.*, June, 1882, p. 633.
5. ALVARDO. Case of retinitis pigmentosa, though no pigment could be seen with the ophthalmoscope. *Rev. di Cienc. med. Barcel.*, No. 9, 1882.
6. AYRES, S. C. Tobacco amblyopia. *Cincinnati Lancet and Clinic*, Feb. 11, 1882.
7. BENSON. Embolism of the central retinal artery of the retina modified by the presence of a cilio-retinal artery, and
8. BENSON. Extreme tortuosity of retinal vessels, both veins and arteries. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 55, 1882, with plate. Observed in a hypermetropic young man of seventeen with convergent squint and good sight.
9. BERT, P. Observations sur le siège du scotôme scintillant. *Compt. rend. hebdom. des séances de la soc. de biol.*, No. 29.
10. BORTHEN, LYDER (Thronhjern). Amblyopie centrale nicotique. *Rec. d'ophth.*, vol. iii, No. 4, p. 110, April.
11. BRUNNER. On quinine-amaurosis. *Inaug. Diss.*, Zürich, 1882. Cases.
12. BULLER. Sudden complete blindness after large doses of quinine. *Med. Central-Zeitung*, vol. li, No. 66. These ARCHIVES, ante.
13. DERIGS. On retinitis pigmentosa. *Inaug. Diss.*, Bonn, 1882.
14. DOR. Anémie rétinienne. Examen ophtalmoscopique d'un cas. *Paris méd.*, 1881, No. 13.
15. EALES (Birmingham). Embolism of central retinal artery. Re-establishment of circulation. Restoration of vision. Permanent central scotoma. *Ophth. Rev.*, vol. i, April, 1882, p. 139.
16. EWETSKY, THEO. (Moscow). Case of syphilitic central retinitis. *C. f. A.*, vol. vi, p. 170, 1882.

17. FUCHS. Arterio-venous aneurism of the retina. *Arch. f. Augenheilk.*, vol. xi, p. 440. These ARCHIVES, this number.
18. GRIFFITH. Glioma of retina. Tubercle of choroid. *Brit. Med. Journ.*, June 17, 1882, p. 911. Demonstration of specimens.
19. HAAB. On cortex-hemianopsia. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 141.
20. HELFREICH. The arterial pulse of the retina. Memorial essay in honor of the three hundredth anniversary of the Jul. Max. University of Würzburg, Leipzig, Vogel.
21. HIGGENS, C. Two cases of disease of the eye simulating glioma. *The Lancet*, No. 21. Nothing new; in one case formation of connective tissue in the retina, then detachment.
22. HORSTMANN. On visual disturbances after loss of blood. *Deutsche med. Wochenschr.*, No. 28, and *Zeitschr. f. klin. Med.*, vol. v, No. 2.
23. KLEIN. Retinitis. Article in *Eulenburg's Real-Encycl. d. med. Heilk.*, vol. ix, p. 451-479.
24. LANG, W. and FITZGERALD. A case of homonymous hemianopsia with paralysis of upward and downward movements of both eyes. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 230, 1882. Rapid recovery, leaving homonymous insular scotomas.
25. MACKENZIE, ST. On a case of acute vascular disease with retinal hemorrhages. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 31, 1882.
26. MARCHAND, B. Contributions to the knowledge of homonymous bilateral hemianopsia and the decussation in the chiasm. *Graefe's Arch. f. Ophth.*, vol. xxviii, 2, p. 63.
27. MICHEL. Report on the occurrence of night-blindness in the work-house of Rebdorf. *Aerztl. Intelligenzbl.*, Munich, No. 30.
28. MICHEL. On so-called day-blindness. *Sitzungsber. d. phys.-med. Ges. zu Würzburg*, 1882, p. 73.
29. MOOREN. On retinitis punctata albescens, *Five lustra of ophthalmological practice*, p. 216, Wiesbaden, Bergmann, 1882.
30. MOOREN. On retinitis pigmentosa, *l. c.*, p. 219.
31. MULES. Tubercle of the retina. *Trans. of the Ophth. Soc. of the Unit. Kingd. The Lancet*, No. 20.
32. NETTLESHIP, E. Two cases of extreme tortuosity of the retinal veins in otherwise healthy eyes, with plate. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 57, 1882. In one with hypermetr. astigm. and V— $\frac{1}{18}$; the other in a person with normal vision.
33. PARINAUD, H. Des rapports croisés et directs des nerfs obliques avec les hémisphères cérébraux. *Compt. rend. hebdom. des seanc. de la soc. de biol.*, No. 10.
34. PESSATSKY. Patho-anatomical changes of the retina in some general diseases of the eye. *Inaug. Diss.*, St. Petersburg, 1882.
35. PONCET (Cluny). Du gliome de la rétine. *Arch. d'ophth.*, vol. ii, No. 3, with illustration.

36. ROMORINO. Distacco retinico curato colle iniezioni ipodermiche di pilocarpino. *Boll. d' ocul.*, vol. iv, No. 2, Luglio, 1882. Cure of a case of detachment of the retina, due to hemorrhage, after twenty-two injections of pilocarpine.

37. REICH, M. An interesting and rare case of hemianopsia. *Med. Uebersicht*, April, 1882, p. 123.

38. SAUNDY and EALES (Birmingham). The changes in the fundus of the eye in anæmia. *Rev.*, Aug., 1882.

39. SCHWEIGGER. On embolism of the central retinal artery. *Arch. f. Augenheilk.*, vol. xi, p. 444. Controversy with Stellwag in regard to misinterpretation of the first case of embolism, observed and diagnosed by v. Gräfe, of which Schweigger gave the clearest anatomical proof.

40. STREHL. Cases of so-called scintillating scotoma. *Rep. of the Roy. Ophth. Clin. of Munich*, vol. i, pp. 97-126.

41. SWANZY, H. R. Multiple retinal hemorrhages, with detachment of the vitreous humor, causing blindness. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 41, 1882.

42. TWEEDY. Nyctalopia and hemeralopia. *Royal Lond. Ophth. Hosp. Rep.*, vol. x, No. 3, Aug., 1882, p. 413.

43. ULRICH. Embolism of a branch of the central retinal artery. *Klin. Monatsbl. f. Augenheilk.*, July, 1882, p. 238.

44. ULRICH. Three cases of typical retinitis pigmentosa with rudimentary persistent hyaloid artery. *Klin. Monatsbl. f. Augenheilk.*, July, 1882, p. 242.

45. VETSCH. On glioma of the retina. *Arch. f. Augenheilk.*, vol. xi, p. 413. These ARCHIVES, this number.

46. WESTPHAL. On localization of hemianopsia in man. *Charitt-Ann.*, 1882.

ABBOT'S (2) theory of the irritation of the retinal fibres by light is based on the assumption that the rays of light, after they have passed through the refractive media, produce molecular motion on the pigment-layer which then strikes the rods and cones, through which it is transmitted. The logical conclusion of course would be that where there is no pigment there cannot be any perception of light, a conclusion which is overthrown by the fact that albinos can have good sight.

HELFREICH (20) made observations on the arterial pulse of the retina in thirty cases. In insufficiency of the aorta (10 cases) he found: 1, the capillary pulse upon the papilla, first observed by Quinke, which manifests itself by the redness during the systole, and the succeeding paleness during diastole; 2, the pulse of the retinal arteries. The former phenomenon is of relatively little importance in comparison to the latter. In the ten cases it was clearly marked in four, only slightly in three, and in three not at all. The same observations were made in three cases of stenosis combined with insufficiency, while in one case of insufficiency of the aorta and mitral valve there was no pulse, and in another plainly visible. There was a venous pulse in only three cases. In pure hypertrophy of the heart pulsation was not observed, also not in stenosis of the aorta. The phenomena are not more clearly marked in aneurism of the

arch of the aorta than in insufficiency alone. No arterial pulse was observed in cases of lead poisoning, in spite of the characteristic pulsatory curve.

As regards inflammation of the retina, ABADIE (1) observed the presence of albumen in the urine long after the discovery of retinitis albuminurica. Perhaps hypertrophy of the heart is the cause both of the interstitial nephritis and the retinal affection, which Abadie would like to call Bright's retinitis.

MARCKWORT.

MACKENZIE (25) reports a case of acute vascular disease with retinal hemorrhages in a man of twenty-eight, who died after less than a week's illness, having had symptoms pointing either to scurvy, idiopathic anæmia, hæmophilia, or purpura hæmorrhagica. M. believes the last most likely. Owing to decomposition necropsy threw no light on the case.

FITZGERALD.

SAUNDBY and EALES (38) found marked paleness of the disc and retina in sixty-one cases, fifty of whom suffered from chlorosis and eleven from spontaneous, traumatic hemorrhage respectively. In two cases he observed whitish-yellow flakes in the retina, in four slight neuro-retinitis, while atrophy of the optic nerve was seen but once after childbirth.

SWANZY (41). Man of thirty-five. Sight of left eye had failed rapidly three months before. At examination there was good p.l., and projection was good down and out, but wanting up and in. Exterior of globe, cornea, iris, and lens were normal. Tn. No pain at any time. Grayish opacity behind lens, which proved to be detached and shrunken vitreous. Retina, which was in situ, showed small peripheral hemorrhages. In the other eye, V was nearly normal, but there were also minute peripheral retinal hemorrhages, with floating opacities, and streaks of connective-tissue formation in vitreous.

Patient seemed in perfect health, but pulse-tracings showed increased arterial tension.

FITZGERALD.

MOOREN (29) describes a form of disease which he calls retinitis punctata albescens, which he saw but once; the fundus of the eye appears covered with innumerable punctate, whitish spots, resembling crystals of cholesterine, though not so shiny. The papilla was not distinctly visible, and of a grayish color; the retina not transparent; V reduced to $\frac{1}{6}$.

EWETSKY (16) reports a case of unilateral central syphilitic retinitis, in which he found a central scotoma with a normal field of vision. The retina was covered with small whitish dots. Excellent result obtained by inunction.

In ALVARDO'S (5) case retinitis pigmentosa was only probable, as no changes in the pigment were noticeable. In Valencia, Alvarado saw among 5,414 cases of eye-disease, 32 = 0.6 % of hemianopsia, in nine of which = 0.17 %, or 28.1 %, resp. retinitis pigmentosa was found.

MOOREN (30) saw *unilateral* retinitis pigmentosa with hemeralopia only twice in 182 cases. The percentage of Jews considerably exceeds that of Christians; at all events, the pathogeny may be sought in about $\frac{1}{4}$ of all cases in consanguinity. Heredity also plays an important part. Its earliest occurrence was noted in a boy three years old. Congenital hemeralopia may precede the development of retinitis pigmentosa in one generation, while it succeeds it in the next; the one eye of one and the same person may even become affected in the latter order, the other in the former. Mooren considers transmission by heredity of the utmost importance.

In opposition to Denissenko, ADAMÜCK (3) regards shrinkage of the vitreous to be indispensable to detachment of the retina, and that the layer of pigment-epithelium, which offers considerable resistance to the liquid exuding from choroidal blood-vessels, should be perforated. The bulging of the sclera is also favorable to the development of detachment of the retina in myopia. When the volume of the vitreous is diminished, the changes described by Denissenko may in some cases give rise to development and obstinate continuance of detachment.

HIRSCHMANN.

BENSON (7) states that since the publication of Mr. Nettleship's remarks on the occurrence of cilio-retinal blood-vessels, he has been on the watch for cases to test the accuracy of two of his "general statements": 1st, That the presence and size of the communicating vessel does not appear to bear any relation to disease; 2d, that no practical significance can at present be attached to this peculiarity in the blood supply of the yellow-spot region. B. argues that if these vessels run the course N. describes, they must, in the event of embolism of the central artery, help to supply that portion of the retina to which they are distributed, and so save it from sharing in the general destruction of the rest. B. has had the good fortune to observe such a case, the result being preservation of good central vision. The employment of electricity appears in this case to have been attended with good results.

FITZGERALD.

EALES (15) reports a case of a woman, æt. twenty, who in September, 1879, was attacked with sudden blindness in her right eye. On examination about an hour later E. found there was no perception of light, and the ophthalmoscope showed the usual appearances in such cases—the trunk and branches of the retinal artery were much contracted and filled with detached columns of blood. Patient's general health good. No cardiac lesion. Urine contained slight traces of albumen, but no casts. By the following December scarcely any difference between the appearances of the retina and its vessels in both eyes could be noticed. Disc in right eye slightly paler; vision had gradually returned except in small spot in centre of field. E. considers the rapid restoration of circulation against the theory that it was through the collateral branches of anastomosis. He thinks it most likely that the embolus became rapidly broken up in the passing blood-stream, and that the particles were carried into the smaller branches of the artery and became absorbed. The non-recovery of the central vision was probably due to destruction of the delicate extra-vascular structures of the retina at the fovea.

FITZGERALD.

In a man of twenty-six, FUCHS (17) discovered an arterio-venous aneurism, downward and inward from the papilla, due to a blow on the eye. The artery, which shows nodular swellings, at once widens, as does also the tortuous vein, and both disappear in a dark disc (spurious aneurism?). Sometimes a process of degeneration sets in in the membrane in form of white stellate spots like those of morb. Brightii, or the retina degenerates in a ribbon-shaped form composed of small white dots. V — eccentric counting of fingers at a distance of $\frac{1}{2}$ metre.

ULRICH (43). In a man of thirty-two a central scotoma suddenly developed in the right eye, though he could see clearly through an aperture in its centre. The branch of the retinal artery which diverges upward and outward had dwindled away to threadlike thinness, the surrounding part of the retina was of a milky

color; the diagnosis of embolism of that branch of the retinal artery could therefore be diagnosed with certainty.

AGNEW (4) observed a glioma of the retina, or rather gliomatous degeneration of the whole eye, in a boy of six months, which necessitated enucleation. One and a half years later glioma of the other eye, which also was enucleated. Nine years later no relapse.

PONCET (35) reports a glioma of the retina in a boy of five. Enucleation. Five months later a relapse, necessitating exenteration of the orbit. Cure. The glioma involved one half of the retina, which had become detached and projected from the papilla 1 cm. into the vitreous; colloid and fatty degeneration of its elements. The other half of the retina was only slightly detached. The choroid partly atrophic, partly involved in the tumor, which sprang from the pigment-epithelium, and had spread into the deeper layers of the choroid. Lamina cribrosa intact, but gliomatous infiltration beyond it, therefore relapse. A few isolated nests of glioma-cells in the ciliary part of the retina, also in the vitreous. The author lays stress on the absence of cells with divided nuclei or several nuclei, and does not believe that the rapid growth is due to subdivision of the cells. The origin of the tumor must not be sought in any particular layer of the retina. The author assumes a partial return of all these layers belonging to the neuro-epithelium to an embryonic condition, in which no differentiation exists. Propagation took place in this case like in two others of Knapp and de Vincentiis by detachment of glioma-particles, which then proliferated on their new basis. Where there is detachment of the retina the growth of the tumor is slower, the probability of perforation is also less. V. MITTELSTADT.

According to VETSCH (45) glioma occurred in the Zürich ophthalmic clinic in 0.03 per cent. of all cases (in Berlin 0.05 per cent.). Report of twenty-four cases, with special regard to their termination. Both sexes are afflicted to the same extent, neither is there any difference in the side. Congenital glioma was observed in three cases, in each unilateral; in the first and second years it occurs twice as often as in the next six years put together. In regard to its cause nothing definite could be determined. A particular new and characteristic symptom, observed in seven cases, or 32 per cent., was megalocornea, which must be referred to increased tension. In nine cases no operation was performed; death ensued in these on an average after sixteen months. Of thirteen who were operated five lived, eight died. In five cases there was a relapse in the orbit, in one with scleral perforation in the parotid after three years, in another after the same length of time in the eye. Two were cured (no relapse after seven and nine years respectively). In recent cases the microscope revealed, besides round-cells, a number of cells with two and more offsets of various length, which Schultze has shown to be normal components of the granular and intergranular layers.

In regard to functional disturbances AYRES (6) reports a case of nicotine-amblyopia in a man of fifty, who smoked and drank but little, but used about two ounces of snuff every day. Rapid decrease of V, in the right to $\frac{1}{100}$, in the left to $\frac{1}{80}$. Rapid improvement after injection of strychnine.

BORTHEN, LYDER (10) frequently failed in detecting a central scotoma in cases of nicotine-amblyopia with colored papers 1 cm. square, while it became plainly

apparent when paper only 4 *mm.* square was used. Borthen saw two cases of nicotine-amblyopia in women. MARCKWORT.

In a woman of twenty-eight HORSTMANN (22) observed, four days after abortion with profuse metrorrhagia, visual disturbances and concentric limitation of the field of vision, under the semblance of a slight neuro-retinitis. He could observe its development from the very beginning. It terminated leaving sight slightly impaired, and an insignificant concentric limitation of the field of vision. He then gives a short historical sketch of visual disturbances, after loss of blood, observed up to date. In almost all cases there was a more or less marked opacity of the optic nerve and the retina or atrophic discoloration of the optic nerve. Sight was regained in only the rarest cases; the rule is lasting total amaurosis, or at least a high degree of amblyopia. In a few cases one eye only was affected. He also reports visual disturbances after epistaxis, hemorrhage from the urethral mucous membrane and after blood-letting, besides after bleeding from the digestive and genital organs. Nothing definite is known as yet as to the connection between the cause and effect.

TWEEDY (42) treats of the terms "nyctalopia" and "hemeralopia" according to their etymology and the meaning attached to them by the older and later medical writers.

HAAB (19) reports two cases of cortex-hemianopsia, in which the location of the visual centre in the cortex could be proven at the autopsy by the destruction of an extensive portion of the cortex of the occipital lobe. One case (Huguenin's) was that of a young girl eight years old; poorly developed, scrofulo-tuberculous disposition, complained of periodic headaches, weak memory, vomiting; later, convulsive attacks lasting three to four days, without any disturbances of motility or sensation, only a lack of energy. Reflex action prompt. No ophthalmoscopic changes. A few weeks before she died, right-sided hemianopsia. The autopsy revealed the presence of two tumors, one at the apex of the left frontal lobe, the other at the apex of the right occipital lobe, the brain being about normal in other respects, with the exception of slight thickening of the pia mater at the chiasm. Both tumors are caseous, without any blood-vessels. The author ascribes the visual disturbance only to the second tumor. The other case was one of a woman, sixty-one years old. Left-sided paresis and hemianopsia of both eyes due to endocarditis, with vertical boundary-line in the field of vision. Fundus normal. The autopsy showed: defect at the apex of the right occipital lobe, cystoid softening of the entire surroundings of the sulcus hippocampi, confined especially to the cortex and due to embolism. Nothing else abnormal.

MARCHAND (26) reports three cases of homonymous bilateral hemianopsia, together with the autopsy: (1) Left-sided hemianopsia in the upper quadrant in a young man of twenty-three, without any cerebral disturbances. Tumor in the gyrus hippocampi of the right side, extending to the temporal lobe and right optic tractus, though only the surface of the tractus appears softened. The tumor is 7 *cm.* long, 3 high, 2.5 thick, and of a gliomatous structure. The optic nerves seem normal. The lower lateral fibres of the optic nerve had been destroyed. (2) Similar case of softening of the left tractus and right-sided bilateral hemianopsia in a woman thirty years old. The autopsy revealed

thrombosis of left internal carotid and a wedge-shaped infarct emanating from it, which extended into the left optic tractus. Soft degeneration of one third to one half of the tractus. The insula likewise had softened. (3) Softening the size of a hazel-nut at the apex of the right occipital lobe in a person seventy-two years old, with left-sided total hemianopsia. On the lower surface of the anterior lobe a white, firm body the size of a cherry-stone (dead cysticercus) was embedded. A short critical review of the literature in question follows; he accepts twenty-two cases as genuine.

The author also reports the micro-anatomical condition of the optic tractus in an atrophic optic nerve, where he found in the chiasm the upper, then the middle, atrophic fibres uncrossed, another portion crossed; the latter appear on the lower surface nearer the median line.

REICH (37) describes a case of right-sided hemianopsia with good central vision ($\frac{2}{3}$ in each eye), vertical dividing line, no ophthalmoscopic changes in the optic nerve for three and a half years; syphilis probable only from anamnesis; later, dementia not observed by the author; paralytic symptoms; death; one and a half months previously total amaurosis. The autopsy showed a softening and atrophy in the left occipital lobe. Softening in the corpus striatum; the optic thalami flattened. The author calls attention to the fact that destruction of the central organ had been going on for several years without producing secondary atrophy of the optic nerve.

HIRSCHMANN.

WESTPHAL (46). A man of thirty-eight suffered from loss of consciousness, aphasia, chronic twitchings in the facial nerve and the right arm; later, paresis of these parts and hemianopsia without any ophthalmoscopic changes. The autopsy showed: posterior left central gyrus thinned, firm adhesion of the pia mater to the brain, due to chronic inflammation in the cortex of left occipital lobe. He assumes that this caused the hemianopsia. The case is of especial interest, as degeneration was confined to the cortex.

VI.—OPTIC NERVE.

1. BERGER (Graz). On formations of connective tissue in the optic nerve, the papilla, and the retina. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 269.
2. BRAILEY, W. A. Disease of the optic nerve in a case of retinal detachment. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 91, 1882.
3. EDMUNDS, WALTER. Contributions to the pathology of double optic neuritis. *St. Thomas' Hosp. Rep.*, vol. xi, 1882.
4. FUCHS. Contribution to the congenital anomalies of the optic nerve. With an illustration. *v. Graefe's Arch. f. Ophth.*, vol. xxviii, 1, p. 139.
5. GRIFFITH, A. H. (Manchester). Horizontal hemiopia with atrophy of half of optic papilla. *Ophth. Rev.*, vol. i, March, 1882, p. 153.
6. HIGGINS. Trois cas d'atrophie simple des nerfs optiques observés sur les enfants d'une même famille. *Rec. d' ocul. du sud-ouest.*, vol. iii, p. 154.
7. HILBERT (Königsberg). A peculiar anomaly of pigmentation of the fundus. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 276.
8. HUE. Essai sur les tumeurs du nerf optique. *Thèse de Paris*, p. 162, May, 1882.

9. HULKE. Spurious neuroma of the optic nerve. *Roy. Lond. Opth. Hosp. Rep.*, vol. x, 3, Aug., 1882, p. 294.
10. LAWSON. Sarcoma springing from the sheath of the optic nerve. *Roy. Lond. Opth. Hosp. Rep.*, vol. x, 3, Aug., 1882, p. 296.
11. MACKENZIE, S. Double neuro-retinitis, total loss of vision. *Brit. Med. Jour.*, April 29, 1882, p. 617.
12. MOOREN. On neuritis optica. *Five lustra of ophthalmological practice*. Wiesbaden, Bergmann, 1882, p. 234.
13. NETTLESHIP. Case of injury to the optic nerve. *St. Thomas' Hosp. Rep.*, vol. xi, 1882.
14. PANNARD. Elongation des deux nerfs optiques pour une atrophie de ces nerfs d'origine syphilitique. *Soc. de chir.*, Séance de 12 Avril. *Gaz. méd. de Paris*, No. 16.
15. RAMPOLDI. Ambliopia progressiva da bilaterale atrofia dei nervi ottici. Morte repentina prodotta da Rottura di un aneurisma della branche terminali della carotide interna. *Osserv. ottal. Ann. Univ. di Med.*, v, 261, 1882.
16. RUMSCHEWITSCH (Kiew). Unilateral pigmented atrophic optic disc. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 279.
17. SAMELSOHN (Cologne). The anatomy and nosology of retro-bulbar neuritis (amblyopia centralis). *v. Graefe's Arch. f. Opth.*, vol. xxviii, 1, p. 1-110.

BERGER (1) reports three cases of unilateral formation of strands of connective tissue of silvery sheen and fine longitudinal striation. They lay very near the surface of the retina and papilla. V normal, also the blood-vessels. He considers them to be remnants of a former neuro-retinitis, which, perhaps, developed in early youth or in intra-uterine life. No congenital syphilis.

BRAILEY (2). Man of fifty. Retinal detachment at and just below the macula. Refraction was highly myopic, and vitreous contained numerous floating opacities. Excision for supposed choroidal sarcoma. This supposition proved incorrect, but there was found in optic nerve a new growth of peculiar character. The nerve was much thickened, owing to a new-formation of fibrous tissue, arranged in longitudinal bands, made up of extremely fine, wavy filaments. Many of these fibrous zones contained large cavities resembling those which, in myxomatous tumors of optic nerve, contain the mucous tissue. The iris and optic disc gave evidence of a former glaucomatous condition.

FITZGERALD.

EDMUNDS (3) reports a very important case, showing the extreme rapidity with which optic neuritis and meningitis may sometimes follow fracture of the skull. F., æt. eight, died twenty-four hours after rupture of liver and kidney, with fracture in middle fossa of base of skull. The fracture did not pass into the orbits, nor near the optic nerves. Post-mortem examination showed "some meningitis at the base of the brain," the optic nerves of a reddish color, and some pyriform swelling of the nerve behind the eye. Microscopical examination showed increase of nuclei of the outer sheath of the optic nerve, the inter-vaginal space stuffed with densely packed cells, the inner (pial) sheath less inflamed; commencing inflammation along the intrinsic blood-vessels and trabeculæ of the

nerve more marked at periphery than centre of nerve. Commencing oedema with inflammation of capillaries in papilla. General distension of blood-vessels, with excess of leucocytes. No decided distension of sheath of nerve. An excellent lithographic plate showing the microscopical changes. NETTLESHIP.

MACKENZIE (London) (11) reports the case of a patient, æt. twenty-four, who had, in September, 1878, after pursuing a rabbit, fallen down and remained unconscious for about thirty-six hours. By-standers stated that he had kicked and struggled violently, and that he had had twenty fits. He suffered severely for some time from headaches, especially on exertion, but was able to resume work in ten weeks. He still suffered at times from headaches. In spring of following year had another "fit," and was unconscious for four or five hours. About three months had another "fit," much slighter; and since then has had "fits" at more frequent intervals, every four, five, or six weeks. In November, 1881, found he could not see with right eye, and had some darting pain in the head, chiefly toward the back. Sight of left eye then became impaired, and he had to give up work about Christmas, and the following January he had quite lost the sight of the right eye, and the left rapidly became worse, until about three weeks before his admission to the London Hospital, when he had lost all perception of light. No history of syphilis. Had given up all alcoholic drinks a year before first "fit." Generally vomited when he had the "fits," or sometimes independently of them. No strabismus. Pupils equal and dilated. Ophthalmoscope showed margins of discs blurred and indistinct. Surfaces slightly striated; exudation present to a large extent; arteries very small; veins dark and prominent. Treatment: iodide of potassium and mercurial inunction. M. considered that the symptoms, taken with the changes in the discs, rendered the existence of a tumor not improbable, but there was no direct evidence of its presence. The total loss of vision was unusual in neuro-retinitis, but he attributed it to the great amount of exudation present, due to the late stage of the disease. *British Medical Journal*, April 29, 1882, p. 617.

FITZGERALD.

MOOREN (12) believes that there is only a difference in degree between optic neuritis and neuro-retinitis, as the causes of inflammation are the same in both; neither is there any anatomical or clinical difference between them. The recurrent forms of retinitis in brain syphilis may be regarded as due to stasis within the blood-vessels, caused by the proliferation of connective tissue. The optic nerve then has a swollen, mouldy appearance. The increased sensibility of the patients for light is a characteristic symptom. After syphilis has seemingly been cured, a slight injury to the head may give rise to a syphilitic neoplasm. Comotio cerebri or of the medulla may also produce optic neuritis, though the florid stage of neuritis has never been observed after injuries of the spinal cord, only their consequences in form of anæsthesia or atrophy of the optic nerve respectively. The explanation lies in the vaso-motor disturbance produced by the injury. Optic anæsthesia was also observed in the initial stage of scarlet fever and measles; perhaps they can also give rise to optic neuritis. Of typhoid fever this is certainly true. Heredity plays an important part, which may be explained by endarteritis of the central retinal artery. Interesting details in the original. The dependence of neuritis on diseases of the skin in consequence of vaso-motor reflex action cannot be denied, as well as the connection between affections of the optic nerve and uterine diseases.

SAMELSOHN (17). Detailed report of the case briefly described previously, and of especial importance as being the first anatomical examination of a case of retrobulbar neuritis. It was found to be a partial interstitial neuritis with marked tendency to cicatricial contraction and secondary descending atrophy of the optic nerve-fibres. Among the causes are colds and abuse, especially of tobacco and alcohol. He found these in thirteen per cent., after adding the cases of toxic amblyopia, in thirty-seven per cent. of all diseases of the optic nerve. He considers the central scotoma a characteristic symptom, and as it can be due to only those fibres of the optic nerve, which supply the region of the yellow spot, information could be obtained as to their position in the optic nerve. It was found that the partial grayish discoloration at the most distant part from the globe was exactly in the centre, was surrounded by a margin of normal nerve-fibres of uniform width, and occupied about one half of the whole surface. The degenerated nerve-fibres were then found on the temporal side of the optic nerve, and then, changing from a cylindric to a triangular shape, they entered the papilla and radiated into the retina. The scotoma may be either positive or negative. Absolute scotomas are rare, generally they are relative. In these the diminution of color-perception is especially marked. The colors are changed either in their shade or in their tone. The reduction of the sense of space and of the power of vision is not proportional to the severity of the case. Improvement takes place from the periphery toward the centre. Samelsohn obtained excellent results by giving large doses of iodide of potassium.

GRIFFITH (5) reports the case of a man, æt. forty-two, with horizontal hemiopia and atrophy of half of the papilla. Field of vision, left eye, taken at twelve inches from blackboard, entirely wanting below a horizontal wavy line, which lay from three to six inches below the point of fixation. Supposed to be due to embolism of one or more of the arterial twigs supplying optic nerve.

FITZGERALD.

RAMPOLDI (15) reports a case of bilateral amblyopia due to atrophy of the optic nerve; papilla whitish and slightly sunken, blood-vessels normal, and no trace of a former neuritis visible with the ophthalmoscope. The patient died while under treatment, when an aneurism of the left internal carotid the size of a nut was discovered, which pressed upon the optic nerve and chiasm. The ophthalmic artery was not affected.

DANTONE.

FUCHS (4) endeavors to prove that the choroidal conus at the lower edge of the disc is found comparatively often, though frequently very narrow; that it is the result of congenital checked growth, and must therefore be strictly kept apart from the staphyloma at the temporal edge. An error of refraction is frequently connected with it, generally myopia, also imperfect vision, so that it is of importance in congenital amblyopia. He then gives the statistics of forty-five cases observed by him.

HILBERT (7) observed a slate-colored pigmentation of both discs of a patient, the centre of the physiological excavation being intensely black; on both the inner and the outer half of the disc there are two black pigment spots. The whole optic nerve is surrounded by a circular intensely black staphyloma posticum.

RUMSCHWITSCH (16) also observed a pigmented disc in a boy eleven years

old, who had previously received a severe blow upon the eye, which probably produced atrophy of the optic nerve. The edge of the disc was covered with lumps of pigment of various sizes.

HUE (8) reports a case of sarcoma of the optic nerve in a child seven years old, who died of meningitis nine days later.

HULKE (9) reports the following case: A girl, æt. nineteen, with extensive proptosis of right eyeball. So excessive that with strong effort the eyelids could not be closed, and occasionally in making the attempt the lids slipped behind the globe. The eye began to protrude at the age of six, and had continued to do so very slowly. No pain, but gradual loss of sight. Eye moved consensually with the other. No ophthalmoscopic changes. H. supposed the presence of an exostosis. Made exploratory incision in the conjunctiva, through which, with the finger, he could feel a tumor at the bottom of the orbit, so intimately connected with the optic nerve that it could not be separated from it. Globe removed with tumor. Latter proved to be a sarcoma taking its rise in the loose tissue of the intervaginal space.

FITZGERALD.

LAWSON (10) reports a case, an apparently rapidly growing sarcoma, springing from the sheath of the optic nerve. The patient soon recovered after the removal of the globe and tumor, but the latter shortly recurred, and grew with great rapidity. At the post-mortem, numerous secondary growths were found in different regions of the body.

FITZGERALD.

NETTLESHIP (13) reports cases of injury of the optic nerve, the chief interest of which consists in the record of ophthalmoscopic signs of atrophy of the disc comparatively early after the injury in several of the cases, viz.: one week in case 1 (observed by W. H. Power), two weeks in case 3, one month in case 5. The earliest signs of atrophy probably show the time occupied in the descent of simple atrophy from the optic canal to the eye, a distance of about one inch (25 mm.).

NETTLESHIP.

VII.—INJURIES AND FOREIGN BODIES.

1. BENSON, A. Traumatic suppurative cyclitis and hyalitis. *Brit. Med. Journ.*, May 6, 1882, p. 664. Demonstration of a case.
2. BENSON, A. Injury to the eye causing amaurosis. *Brit. Med. Journ.*, April 22, 1882, p. 621.
3. DUFOUR. Corps étranger dans le cristallin. *Rev. med. de la Suisse Rom.*, Jan., 1882.
4. GRAEFE, A. Epierical remarks on operating for cysticercus. *v. Graefe's Arch. f. Ophth.*, vol. xviii, 1, p. 187.
5. GRIFFITH. Removal of a chip of iron from lens by electro-magnet. *Ophth. Rev.*, vol. 1, No. 9, 1882, p. 243.
6. GRIFFITH. Removal of a chip of iron from the iris. *Ophth. Rev.*, vol. 1, No. 2, 1882, p. 244.
7. HAASE. Case of cysticercus cellulose in the vitreous. *Arch. f. Augenheilk.*, vol. 12, 4, p. 500. These ARCHIVES, this number.
8. HAYAL. Rupture of the globe. Penetrating wound of the sclera. *Schweizer. Z. Ges. f. Nat. u. Heilk.*, Dresden, 1881-82, p. 30.

9. LANDMANN. The action of aseptic foreign bodies which have entered the eye. *v. Graefe's Arch. f. Ophth.*, xxviii, 2, p. 152.

10. LEBER, TH. Remarks on the action of metallic foreign bodies in the eye. *v. Graefe's Arch. f. Ophth.*, vol. xxviii, 2, p. 237.

11. LANDESBURG (Philadelphia). (1) Chip of iron ten years within the vitreous. Two cases cured by paracentesis. (2) Piece of gun-cap in the iris for seven years extracted by iridectomy. (3) Chip of iron in the iris for three years removed by iridectomy. Relatively good results obtained in all cases. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, pp. 320, 323, and 324.

12. LANDESBURG. On the behavior of foreign bodies in the interior of the eye. *C. f. A.*, vol. vi, p. 257. (1) Piece of steel in the fundus for eleven years with preservation of good vision. (2) Chip of steel in the fundus for five years with preservation of normal vision. Elimination of a chip of brass from the interior of the eye by suppuration with preservation of V = $\frac{1}{4}$.

13. LITTLE (Manchester). On foreign bodies in the eye. Three cases. Two were extracted with the magnet; one with the forceps after remaining in the iris sixteen years. *Ophth. Rev.*, July, 1882.

14. NOYES, H. D. A case of lodgment of a foreign body in the cavities of the nose, orbit, and cranium. *Amer. Med. Soc.*, July, 1882.

15. REYMOND. Case of cysticercus in the retina. *Giorn. d. R. Acad. di Med. di Torino*, 8-9 Seduta, 14 Luglio, 1882.

16. RITZEL, JEAN. Blessure de la cornée, de l'iris, et du cristallin par un fragment de capsule. Extraction du corps étranger et guérison complète. *Rev. d'ocul du sud-ouest*, vol. iii, 6, p. 130.

17. VILLALONGA. Staphyloma of the iris due to an injury. *La rev. di cienc. med., Barcel.*, Apr., 1882. *C. f. A.*, vol. vi, p. 311. Abscission with good result.

18. WOOD-WHITE. Foreign body in the eye. *Brit. Med. Journ.*, Apr. 8, 1882, p. 502. A chip of iron $\frac{1}{4}$ " long, which had been embedded in the lens-capsule for eleven years, was extracted with good results.

BENSON (2) showed at the Pathological Society of Dublin a boy who some time previously had been struck under the right eye by a blunt rod of steel. There was no external hemorrhage. The eye was rather prominent, and its motions were restricted. Ophthalmoscopic appearances normal, but sight was quite lost. Lesion probably due to pressure far back of effused blood on optic nerve.

FITZGERALD.

GRIFFITH (5). A piece of metal was lodged in the deepest layers of the lens for seven weeks before patient's admission to the Manchester Eye Hospital, under Dr. Little. Electro-magnet applied without needle to surface of cornea, when the piece of metal flew out and fell into the anterior chamber, from which it was removed through an incision made with a broad needle and the lens substance extracted by suction.

FITZGERALD.

GRIFFITH (6). Patient, æt. forty, came with slight attack of iritis. Stated that he had been struck on the eye sixteen years before by a chip of metal, and since then had had frequent attacks of pain in the eye. On outer and lower quadrant of the iris, midway between the attachment of the latter and

the edge of the pupil, there was a raised brown nodule, the size of a pin's head. No scar could be found on the cornea. An incision was made with a broad needle at the outer edge of the cornea, the aqueous was allowed to flow off slowly, and the foreign body removed with fine iris forceps. FITZGERALD.

LANDMANN (9) first reviews, historically and critically, the literature of foreign bodies which have penetrated aseptically into the eye, and their consequences. He bases his conclusions on the fact established by Leber, that inflammation is produced only by an infected foreign body, and reports some new observations from the Göttingen clinic. He classifies the literature in operation under the following heads: (1) The action of chemically indifferent foreign bodies in the anterior part of the eye; (2) of foreign bodies in the vitreous and the surrounding membranes; (3) of not indifferent foreign bodies, especially in view of the effect produced upon vision by oxydation in the course of years. Detachment of the retina, so frequently the result, is explained by the changes brought about by the foreign body in the vitreous, as it exerts a pull inward. This again gives rise to perforation of the retina and subsequent escape of the vitreous into the subretinal space. He then draws practical conclusions, and approves the generally adopted practice of waiting, unless more serious inflammation sets in.

LEBER (10) adds a note to this, in which he reports the results of his experiments on the action of metallic foreign bodies within the eye; when introduced aseptically, they produce inflammation only when in contact with the iris, not in the vitreous. Detachment of the retina, as above stated, is due to changes in the vitreous. Lead may be considered an indifferent foreign body, while mercury produces severe purulent inflammation, which, however, is not transmitted to other parts of the eye.

NOYES (14) observed the case of a man who had been injured by the explosion of a gun; the right eye was closed, the globe atrophic and united with the inner wall of the orbit, and a large foreign body visible in the posterior part of the nose. When extracted it was found to be a piece of the barrel of the gun, 12 mm. wide and 11 cm. long, and weighing 84 grms., which had penetrated into the brain. The patient died soon afterward from purulent inflammation of the brain. BURNETT.

HAASE (7) discovered a cysticercus in the right eye of a young man of twenty-one, upward and inward from the papilla, which entered the vitreous in the course of a few days. The parasite, which measured 17 mm. in length, escaped spontaneously through a meridional incision of the sclera, according to Graefe, 8-10 mm. long, with only slight loss of vitreous. No reaction. Vision was reduced to recognizing the motion of the hand at 2-3 ft. The author observed five cases of cysticercus among thirty thousand patients in Hamburg, two of which, being subconjunctival, were easily extracted, while an operation was refused in a subretinal one, and another in the vitreous. Three years later, the latter had not yet destroyed the eye.

REYMOND (15) successfully extracted a cysticercus of the retina (as far as known to the reporter, this is the second case observed in Italy). DANTONE.

GRAEFE (4) reports the results of twenty-four cases of extraction of cysticercus according to his method, in sixteen of which, by the smooth removal of the

parasite, a perfect result was obtained, as far as vision and other conditions were concerned. In eight cases in which the operation failed, the cysticercus lay either perfectly bare in the vitreous, with great freedom of motion, or it was surrounded by a number of membranous envelopes. He describes in detail the position and location of the parasites, the subretinal and those situated in the vitreous, the fixed and the movable. The last-mentioned are least suited for an operation. The subretinal ones are also difficult of removal, and the determination of their exact location previous to the operation is of the greatest importance. Gräfe constructed a localizing ophthalmoscope for this purpose, for the description of which *v.* the article itself.

VIII.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

1. ABERCROMBIE, G. A case of unocular diplopia. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 210, 1882.
2. ADAMS, J. E. Two cases of embolism leading to suppurating panophthalmitis in both eyes. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 27, 1882.
3. BEHRING and WICHERKIEWICZ. Case of metastatic chlorosarcoma. *Berl. klin. Wochenschr.*, No. 33, 1882.
4. BOLIS. La tache dorsale e le sue successioni morbose oculari. *Raccogliatore med.*, Nos. 2, 5, 6, 1882.
5. CARRERAS, ARRAGÓ. The measles and their various primary and secondary manifestations on the eye. *La rev. di cienc. med.*, Nos. 12, 14, June-July, 1882. *C. f. A.*, vol. vi, p. 309.
6. CORNILLON, F. De l'héméralopie dans les affections du foie. *Le prog. mtd.*, No. 23.
7. CORNWELL, H. G. Purulent cyclitis in phlegmonous erysipelas. *N. Y. Med. Rec.*, Aug. 15, 1882.
8. COUPLAND, S. Case of neuro-retinitis following contusion of the brain, with meningitis; death five months after the injury. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 73, 1882.
9. CRITCHETT, G. ANDERSON. Neuro-retinitis of right eye in secondary syphilis. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 59, 1882.
10. DOWSE, T. S. On some points in the differential diagnosis of intracranial disease, general paralysis of the insane, and tabes dorsalis. *Brit. Med. Journ.*, May 27, 1882, p. 769.
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23. MILLS, C. K. Notes on twelve cases of brain-tumor. *Amer. Arch. of Med.*, Rep. Aug., 1882.
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25. MULES, P. H. A case of general retinal periarteritis resulting in chronic renal disease, with remarks. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 47, 1882.
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30. PETRUCCO. Dei fenomeni oculari in relazione ai fenomeni generali nell'alcolismo e nicotismo cronici. *Gazz. med. ital. Prov. venet.*, Nos. 24 and 25, Giugno, 1882.
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32. PONCET (Cluny). De l'état du nerf optique et de la rétine chez un ataxique. *Soc. de biol. Séance de 18 Fév.*, 1882, *Prog. méd.*, No. 8.
33. POWELL, DOUGLAS. Clinical remarks on a case of ptosis with pulmonary disease of tubercular (?) origin. *Lancet*, May 6, 1882.
34. RAMBOUD. Contribution clinique à l'étude de la déviation conjuguée des yeux et de la tête dans certains cas d'hémiplégie. *Thèse de Bordeaux*, 1882.

35. RAMPOLDI. Rapporti morbosi esistenti tra l'apparecchio urinario e il visivo. (On the pathological connection between the diseases of the urinary apparatus and the eye.) *Ann. univers. di med.*, Fasc. March, 1882.

36. RAMPOLDI. Un caso di gozzo esoftalmico. (Graves' disease). *Osserv. ottalm.* *Ann. univ. di Med.*, No. 261, 1882.

37. RAMPOLDI. Ischialgia destra acuta; glaucoma acuto intorto alcune ore dopo nell'occhio destro. Guarizione mediante iridectomia. Glaucom. consumato nell'occhio sinistro. *Osserv. ottalm.* *Ann. univ. di Med.*, No. 261, 1882. Acute glaucoma combined with sciatica, after the patient had been standing a long time in the water with bare feet. The author cannot find any satisfactory explanation.

38. SAUNDBY and EALES. Changes in the fundus oculi in anæmia. *Ophth. Rev.*, vol. i, 2, p. 303.

39. SAUNDBY. Migraine, with paralysis of third nerve. *Lancet*, Sept. 2, 1882.

40. SHAW, JOS. Melancholia, with left hemiplegia and defective vision of left eye. Destructive lesions of right ascending convolutions, and gyrus angularis. *Brain*, July, 1882, p. 257. The ocular symptoms could be but imperfectly observed, owing to the mental state.

41. STENGER. The cerebral disturbances of paralytics. *Arch. f. Psych.*, vol. xii, 1.

42. STRÖMPPELL. Case of cerebral tumor, with central unilateral deafness and choked disc of both eyes. *Neurol. Centralbl.*, 1882.

43. SZILI, AD. (Buda-Pesth). Temporary blindness in childbed. *C. f. A.*, vol. vi, p. 169.

44. ULRICH. Five cases of poisoning with meat in one family. *Klin. Monatsbl. f. Augenheilk.*, July, 1882, p. 235.

45. WARREN-TAY. Two cases of optic neuritis, without impairment of vision after injury to the head. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 66, 1882.

In regard to ocular affections after meningitis, HUGUENIN (18) describes four different conditions of the retina and disc, after acute as well as chronic basilar meningitis, which frequently, however, merge into each other, but sometimes develop alone: 1, retinal stasis; 2, oedema of the papilla; 3, neuro-retinitis; 4, atrophy. Detailed description of the individual symptoms.

ABERCROMBIE (1). Girl of eleven. Headache, vomiting, slight double optic neuritis, impairment of speech, and paralysis of right ext. rectus, with converg. strabismus; diplopia with both eyes, and also when right alone was used. Death. A large abscess was found in region of right temporo-sphenoidal and occipital lobes. (It will be noticed that this, and also Dr Ord's two cases, had binocular diplopia from strabismus.)

COUPLAND (8). Boy of five. Fell on his head, and subsequently presented various cerebral symptoms, which are recorded at great length. Necropsy: No fracture of skull, but remains of subarachnoid hemorrhage, and several old hemorrhagic foci in substance of brain, with meningitis.

Reference to parallel case (Leber and Deutschmann, A. f. O., Band 27, Abth. 1, p. 302, 1881) in which patient recovered with optic atrophy.

FITZGERALD.

GOWERS (15). Sequel to a case of cerebral tumor :

The case was one of intracranial disease, with optic neuritis and paralysis of the upward movements of both eyes. (Trans. vol. i, p. 117, 1881.) Patient is better, and upward movements have increased. Discs very pale, but reads No. 2 test-type. Field of one eye normal for white and colors ; that of the other is very irregularly restricted, especially for colors, with scotoma for red and green above fixation point.

FITZGERALD.

At a meeting of the Glasgow Pathological and Clinical Society, Drs. FRASER and GAIRDNER (14) exhibited two interesting cases of aphasia. Both the patients had to some extent become re-educated. An ophthalmoscopic examination had been made by Dr. Meighan. In the first case, the optic disc of the left eye was pale, with a small spot of pigment at the upper and outer side ; the veins were dilated and tortuous, and the arteries small and contracted. The right eye was normal. In the second case, the discs were normal, but the vessels in the left eye were dilated and more numerous than in the right. *British Medical Journal*, May 13, 1882.

FITZGERALD.

At a meeting of the Southeastern Branch of the British Medical Association, Dr. HUGHLINGS-JACKSON (17) showed a drawing of visual projections made by a patient subject to attacks of migraine. J. thinks that in these cases there is a discharge of nervous elements in some convolutions, probably in Ferrier's visual centre.

FITZGERALD.

A case reported by LAWSON (19), which was under observation for about one year. When first seen by L., about eight months after the first observations had been recorded, he found the distant vision of both eyes normal, considerable loss of accommodation, and well-marked optic neuritis in the right eye. At post-mortem examination a tumor, somewhat ovoid in shape, $2\frac{1}{2}$ inches in length, 2 inches in width, and $1\frac{1}{2}$ inches from above downward, was found, occupying a large portion of the anterior third of the right hemisphere.

FITZGERALD.

A. MATHIEU (22) describes a tumor the size of a hen's egg at the external and posterior part of the right cerebral peduncle, occupying the outer layers and extending into the distended lateral ventricle, and the floor of the fourth ventricle ; the eminentia teres decidedly thickened. In view of the left-sided paralysis of the oculomotor nerve which formerly had existed, the author infers total crossing of the nerve fibres at their central termination. v. MITTELSTÄDT.

MILLS (23) reports twelve cases of cerebral tumors, in eight of which ophthalmoscopic data were obtained, and in four microscopical examinations made. In four there was choked disc, and in the same number, descending neuritis. Both eyes were always affected. The autopsy showed that the choked disc was always associated with a cerebral tumor of the convexity, while in the case of descending neuritis the tumors were situated at the base of the brain, being generally tumors of the cerebellum combined with hydrocephalus. The author ascribes the cause of choked disc to the filling of the inter-vaginal lymph-spaces of the optic nerve, whereas he regards descending neuritis as the result of direct propagation of the inflammation to the optic nerve. BURNETT.

POWELL (33). Boy of thirteen, previously in good health, affected suddenly with severe pain in right frontal region ; rigors, some vomiting, and, three days later, paralysis of third nerve (apparently of all branches). Some elevation of temperature. No papillitis ; physical signs of chronic pulmonary disease. P. by exclusion, diagnosed localized tubercular inflammation involving the intracranial part of the third nerve. Believing mercury to be useful, or at least admissible, in early stages of local tubercular processes, P. gave small doses with iodide. Three weeks after onset, third nerve had quite recovered and temperature normal.

NETTLESHIP.

SAUNDEY (39). Woman liable since the age of twelve to attacks of sickness, drowsiness, pain in left temple, and ptosis ; lasting some days and recurring every few months. S. witnessed two attacks, and found, besides ptosis, complete paralysis of the third-nerve muscles, extrinsic and intrinsic (and partial paralysis of dilatator pupillæ ?). The muscles recovered perfectly, except the superior rectus, which remained quite paralyzed, and lev. palb. which only partly recovered. No other neural symptoms. Reference to literature. Case reported carefully in detail.

NETTLESHIP.

STRÜMPPELL (42) reports a case of brain-tumor in an otherwise healthy woman, which caused death in the course of a year. Paresis of the left side of the body, left-sided deafness, amaurosis and choked disc in both eyes. The post-mortem showed a glioma of the middle portion of the posterior central convolution, which had reached the surface in the parietal line.

WARREN-TAY (45). CASE 1.—Man, twenty-one. Fall on the head ; probable fracture of the base of the skull ; slight concussion symptoms, with bleeding from the left ear ; deafness, slight ptosis and weakness of internal rectus on the same side ; pain in the head ; development of double neuro-retinitis, increasing, then subsiding ; vision unaffected ; recovery from the slight paralysis, the deafness persisting.

CASE 2.—Man, twenty-seven. Fall on the head ; concussion ; pain in the head ; optic neuritis (double) noted on twentieth day ; increasing for a week, then subsiding ; vision unaffected ; patient hypermetropic. FITZGERALD.

BOLIS (4) observed in twelve out of twenty cases of tabes ocular affections. In eight of them there was myosis in either one or both eyes, in three there was, besides, atrophy of the optic nerve ; in one, paralysis of the levator palpebræ ; in three others, paralysis of muscles. Stretching the nerve, which had been done for paralysis in other parts of the body with some success, did not produce any change in the ocular symptoms.

DANTONE.

DOWSE (10), in a paper, on the differential diagnosis of intracranial disease, general paralysis of the insane, and tabes dorsalis, states that he has verified the assertion of Graefe, that patients who are suffering from diplopia in tabes dorsalis, show slight tendency to the blending of images in binocular vision ; but in D's opinion, the reverse often occurs in the vision of the general paralytic. He is also inclined to believe from some cases which he has had under observation, that those cases of ataxy which are preceded by sclerosal changes in the optic nerve are frequently cases of abortive general paralysis, and which are decidedly cerebro-spinal rather than purely spinal.

FITZGERALD.

PONCET (32) found complete fatty degeneration of the intraorbital as well

as intracranial, portion of the optic nerve, of an ataxic person; also hypertrophy of the septa. The nerve-fibre and ganglionic layers of the retina were intact. Amaurosis in tabes is due to central structural changes; in this case it had existed for ten years.

V. MITTELSTÄDT.

In regard to progressive paralysis, FERÉ (13) found that in one case it was preceded in the course of one and a half years by five typical attacks of amaurosis partialis fugax. There was right-sided hemianopsia, combined with temporary aphasia and paralysis of the right arm. In later attacks there were also epileptiform convulsions. Caution should therefore be exercised in making a prognosis (though favorable in the great majority of cases).

V. MITTELSTÄDT.

STENGER (41) reports in regard to the cerebral disturbances of paralytics: 1, on soul-blindness and cortex-amaurosis with the result of five autopsies; 2, on hemianopsia based on three autopsies; 3, on visual hallucinations.

In opposition to Gray, who maintains that the pupil of epileptics is more or less dilated in the interval between attacks, PIERRE (31) could not verify this observation, based on fifty-three cases, nor the statement of the same author that contraction here takes place much more quickly.

NIDEN (28) observed a case of recurrent herpes zoster ophthalmicus, no case like which has as yet been reported; five well-marked attacks were observed in the course of six years, with all the symptoms characteristic of herpes ophthalmicus. The case was one of severe injury of the upper part of the spinal column, leaving curvature and periosteal thickening, and probably giving rise to a secondary affection of the upper cervical sympathetic ganglion which produced the attacks.

RAMPOLDI (36) observed a bilateral case of Graves' disease, in which exophthalmus did not develop until fifteen years after the swelling of the thyroid gland (on the left the size of a hen's egg), on the right of the head of a foetus. Marked bruit over the heart and arch of the aorta. Graefe's lid-symptom could only be detected when the patient rapidly looked downward. Vision normal, no arterial pulse in the fundus. The degree of exophthalmus is not given, but the lids could be closed. Rampoldi notes as a peculiarity a large number of pityriasis-spots upon the breast of this patient, as also of another, which extended to the abdomen.

DANTONE.

NETTLESHIP (27). Retinitis, with white patches, in both eyes of a man suffering from diabetes. Cholesterine in vitreous of right eye, probably of two years' duration. Embolism (thrombosis?) of retinal artery in left. History of "diabetes" in early life. Death from gangrene of foot.

FITZGERALD.

After discussing the general toxicological effects of alcohol and nicotine, PETRUCCO (30) describes three cases of parenchymatous and interstitial atrophy of the optic nerve observed by himself, which he would ascribe to the two substances mentioned, though all general symptoms might be wanting.

DANTONE.

In a case of ULRICH (44) the visual disturbances were due to eating rotting ham. The symptoms were impaired digestion, a scratching sensation in the throat, paralysis of accommodation and of the sphincter papillæ. Two members of the family suffered from the two last affections for some time.

SZILI (43) observed a case of blindness four days after a normal delivery, without any other symptoms or ophthalmoscopic changes. Patient was completely cured by confinement in a dark room. Perhaps it may be considered a case of blinding, the retina being highly hyperæsthetic.

SAUNDBY and EALES (38). The authors undertook a series of observations with the view of determining the frequency with which changes, more especially optic neuritis and the like, may be found in chronic anæmia or chlorosis, as seen in young women. In a series of fifty cases of chlorosis, sixteen presented some abnormal appearance of the fundus, and while allowing that in the greatest number the changes were indecisive and of little moment; in five, or, in other words, 10 % of the whole number, they were unequivocal, while in 8% there was evidence of some degree of neuro-retinitis. Though, as a rule, V was normal in these cases, yet in several, in which the pupil was fully dilated by atropine, a perforated disc held before the eye actually depreciated it. This seemed to indicate a failure of light-perception, and S. and E. suggest that possibly this failure of light-perception may be the factor in the production of the dilated pupil, so general in chlorotic girls. In a series of eleven cases of secondary anæmia, the result of hemorrhage-changes of some sort were found in five, though definite changes were found in only two. **FITZGERALD.**

BEHRING and WICHERKIEWICZ (3) describe a very rare case of metastatic chlorosarcoma, which was first noticed in the orbit of the right eye of an otherwise healthy young man of twenty-eight, caused exophthalmus, and was accompanied by choked disc of both eyes. Metastatic proliferation went on very rapidly, while vision diminished proportionately. The ophthalmoscope revealed, besides the characteristic symptoms of optic neuritis, peculiar dark striated thickenings of the retinal blood-vessels, whose origin was first ascribed to rupture, but proved to be neoplastic infiltrations of the walls of the blood-vessels. Two months later death ensued, after the patient had become completely blind and severe cerebral symptoms had developed. The tissue of the neoplasm was found to consist almost entirely of round cells, somewhat larger than white blood-corpuscles, with large nuclei staining intensely; besides these there were short spindle-shaped elements with similar nuclei, filled with numerous fat-granules. The cause of the bright green color which the sections of all these tumors presented could not be determined either by microscopic or microchemical examination. The high percentage of chlorine in all parts of the tumors was very remarkable, and their green color may be fairly brought into connection with this. The tumor probably had originated in the sphenoid cavity, and had then proliferated into the nasal and orbital cavities and into the right medial cerebral fossa.

MILES (25). Man of fifty-nine. All the arteries were converted into shining white lines, and there were numerous retinal hemorrhages. The other eye was normal in every respect. Appended are abstracts of previously published cases, and a colored plate. Ten months later the other eye was affected by albuminuric changes, but without any periarthritis. **FITZGERALD.**

CARRERAS, ARRAGÓ (5) mainly offers some therapeutical remarks on ocular affections in measles. He observed a case of meningitis with optic neuritis after measles, and another of anæmia of the retina, with reduction of vision to $\frac{1}{15}$.

MACKUNA (21) considers that the cornea in small-pox becomes more frequently affected during the stage of scabbing, from the twelfth to the fourteenth day of the eruption, when the patient is getting over the secondary fever, and is associated with the formation of furunculous abscesses in other parts of the body in severe confluent cases. Constitutional treatment is of the utmost importance in these cases. Locally he applies lint soaked in a lotion of belladonna with sulphate of copper and tepid water. In the case of children and some persons who find it hard to keep their eyes at rest, and also to prevent scratching, M. speaks in favor of Cellini's eye-protectors. These are zinc plates made of the same size as the eyelids and fixed by means of an elastic band. FITZGERALD.

According to CORNILLON (6), hemeralopia occurs in all kinds of affections of the liver, and probably is due to the icterus accompanying them. He reports three cases of simple hypertrophy of the liver, and of cirrhosis in the hypertrophic and atrophic stage. In each, hemeralopia was at first but temporary, but later became persistent; once improvement after a diet of raw ox-liver (?). An ophthalmoscopic examination was only made in the first case, when a high degree of venous hyperæmia and arterial anæmia combined with peripapillary cedema was observed. V and color-perception normal in good illumination.

V. MITTELSTÄDT.

CRITCHETT (9). Woman of twenty-three. History of acquired syphilis, the first symptoms of which were noticed four months before. Condylomata and roseolous rash. Left eye, V = $\frac{1}{2}$ and J. 1. Fundus normal. Right eye, V = J. 16. Well-marked optic neuritis with retinal haze. FITZGERALD.

ADAMS (2). Case 1.—Girl of thirteen. Rheumatic history. Symptoms of endocarditis, with panophthalmitis of both eyes, followed by gangrene of legs. Death. Aortic valves covered with masses of soft vegetations; embolic changes in spleen and right kidney. Vitreous in each eye in state of suppuration. Microscopic examination of optic nerves failed to show any plugging of arteries, or the presence of micrococci or bacteria.

Case 2.—Boy of fifteen. History of acute rheumatism and disease of mitral valves. Acute attack of endocarditis with pyrexia. Panophthalmitis of one, and a week later of the other, eye. Death. No post-mortem. A. suggests that these cases may have been septicæmia and not rheumatism. FITZGERALD.

CORNWELL (7) made the same diagnosis in a woman suffering from erysipelas of the right side of the face, which was followed by injection of the right eye, hypopyon and diminution of vision, and intraocular pressure. Although the inflammation subsided, sight continually diminished until three weeks later death ensued. Probably there was septic embolism.

NETTLESHIP (26). Man of forty-eight. Right eye had no p. l.; disc very pale, and vessels small. Eye had been perfect until a month before, when severe erysipelas of side of face and head came on. The upper lid "broke," and a slough came out, and when the swelling of lids had subsided so as to allow the eye to be opened, it was found to be blind. FITZGERALD.

EDMONDS (12). Man of thirty-two. Ligature of left common carotid for wound of throat. Four or five days afterward left eye was noticed to be affected, and on tenth day after ligature there was well-marked panophthalmitis. Right hemiplegia came on, and patient died twenty-five days after ligature.

Post-mortem examination: three abscesses in left side of brain, and basal meningitis. Left eye: whole of vitreous converted into pus; much inflammatory material in nerve-sheath, extending slightly into substance of nerve along trabeculae. Retina swollen; choroid inflamed. References to three other cases.

FITZGERALD.

The conclusion of the report for 1882 will appear in the next number.

MISCELLANEOUS NOTES.

The fifth international Congress for Hygiene, which meets at the Hague in 1884, will award a prize of 2,000 francs for the best essay "On the causes of blindness and practical measures to prevent it."

PROGRAMME.

1. *Causes of blindness*: (a) Influence of heredity; (b) eye-diseases of childhood; (c) school-life and apprenticeship, progressive myopia; (d) general diseases, diatheses, fevers, intoxication; (e) influence of trade, accidents, injuries, sympathetic ophthalmia; (f) social and climatic influences, contagion, unhealthy dwelling-places; (g) improper or neglected treatment of eye-diseases.

2. *Point out the appropriate means of prevention for each group of causes*: (a) legislative; (b) hygienic and professional; (c) pedagogic, medical, and philanthropic measures.

The prize of 2,000 francs will be awarded for the best unprinted essay written in English, German, French, or Italian, by the *Society for the Prevention of Blindness* in London, and conditionally a second prize of 1,000 francs, or two of 500 francs each, and a medal with a diploma by the *Société internationale pour l'amélioration du sort des aveugles*. The manuscripts with a motto, and without mention of the author, but accompanied with a sealed envelope containing the same motto and the name of the author, have to be in the hands of the secretary, Dr. G. Haltenhoff, Geneva, Switzerland.

We take pleasure in noticing the appearance of the following works:

1. J. R. WOLFE, M.D., of Glasgow: *On Diseases and Injuries of the Eye*. Philadelphia: P. Blackiston, 1882; \$7. The author, well known by his original method of transplantation of flaps without pedicles, and of rabbit's skin to the human conjunctiva, publishes in a text-book of 452 pages, a course of systematic and

clinical lectures to students and medical practitioners. Ten colored plates with twenty small ophthalmoscopic figures, half well, half (for instance the four on optic neuritis) very poorly executed from drawings of Dr. Magnus of Breslau, are embodied in the volume. The book is clearly and attractively written and will be read with pleasure and profit, not only by the student and practitioner, but also by the ophthalmic specialist.

2. W. R. GOWERS, M.D.: *A Manual and Atlas of Medical Ophthalmoscopy*; 2d edition, 1882; P. Blackiston, Philadelphia; \$6; 384 pages; many original plates. This book is exceedingly valuable, both to the general practitioner and the oculist, for the many original observations it contains.

3. C. S. FENNER: *Vision and its Defects*; 2d edition, revised by the author before his death; P. Blackiston, Son, & Co., Philadelphia, 1883. This elementary treatise on refraction and accommodation, with an introduction on optics and seventy-four woodcuts, may be recommended to the beginner.

4. New editions appeared last year of the popular text-books of Magnamara, Nettleship, and Mittendorf.

5. Though not a work on ophthalmology, the *Text-Book of Pathological Anatomy and Pathogenesis*, by Prof. E. Ziegler, of Tübingen, translated and edited for English students by D. Macallister, Cambridge, can be highly recommended. Part I—General Pathological Anatomy,—the only one out thus far, is a concise and excellent exposition of pathology, in which the chapter on parasites (bacteria, etc.) will be particularly welcome.



ARCHIVES OF OPHTHALMOLOGY.

THE VORTEX AND THE NUCLEAR ARCH OF THE HUMAN LENS.

By OTTO BECKER, M.D.,

PROF. OF OPHTHALMOLOGY AT THE UNIVERSITY OF HEIDELBERG.

(Fig. 4, plate ii.)

Translated by R. O. BORN, M.D., New York.

MY researches in regard to the pathological changes of the human lens, which I have carried on for years, convinced me very soon that we do not possess a sufficiently accurate knowledge of the healthy lens. Several questions as to its architecture can only be answered by accurately meridional sections of such fineness that their thickness does not much exceed the breadth of a single fibre.

As, according to Henle, the breadth of the fibres in the peripheral layers, which only interest us at present, is 0.011 mm. , the section, in order to be of any value, must not be much thicker than 0.011 mm. , and must certainly not exceed twice that thickness. Besides, if we want to trace distinctly the course of an individual fibre, the planes of the section must be perfectly parallel and at the same time be accurately in a meridional direction, since the least deviation would give an oblique section of the adjoining layers of fibres.

Moreover, if we remember the arrangement of the fibres in the human lens, it will be plain that only the young fibres which do not terminate yet in the radii of the star-figure, but which have their insertions at the posterior capsule and the anterior epithelium, can appear entire in

one section, because these fibres only lie in one plane, the other fibres turning in opposite directions as soon as they reach the radii.

As the layer of fibres which have not yet attained their full development is thicker in the lens of the embryo and the newborn than in that of the adult, the former will offer much better opportunities for deciding disputed questions.

By the concurrence of some fortunate circumstances, I am in the possession of such sections, or since, properly speaking, every lens can furnish only one such section of a one-celled entirely meridional section with the adjoining layers. The views which, starting from observations on animals, had for some time also been adopted for the human lens, are by this section precisely defined and finally established. A more detailed description of the specimen, accompanied with a drawing, may therefore not be unwelcome.

The lens, from which this section was taken, came from an eye which had a sagittal diameter of 15.5 *mm*. The child had been prematurely born and had died during birth, and the eye had been transferred to Müller's fluid in such fresh condition that not a trace of the contents of the fibres could be found in the radii of the star-figure, between the lens and posterior capsule and between the lens and the anterior epithelium. The objections of Hensen and Sernoff against the opinions of Bowman, v. Becker, and others, apply therefore also to the human lens. There are also in the human lens no star-shaped fissures with amorphous contents, but the ends of the fibres join directly. The so-called Morgagnian fluid is a post-mortem product. I attach so much importance to this point, because it shows that only the examination of those lenses of animals or of the human eye in which no extravasation of albuminous fluid can be traced, will give any idea of the structure and relation of the fibres as they are during life.

The lens, which in opening the eye had been luxated, was embedded in Calberla's albumen-glycerine mass, as modified by Ruge. When cut with Thoma's large micro-

tome, the consistency of the embedding material and of the lens was so uniform that we succeeded in making a considerable number of sections hardly more than 0.01 *mm.* in thickness through the entire lens. The strictly meridional section and its nearest neighbors show some peripheric fibres to the extent of from 2 to 3 *mm.*

These sections furnish very accurate measurements of the dimensions of the lens. The equatorial diameter of the lens is 5.9 *mm.*, the sagittal 4.24 *mm.*; the radius of curvature of the anterior surface is about 3.75 *mm.*, that of the posterior surface 3.00 *mm.* Since the transition from the anterior to the posterior surface is very obtuse, the form of the entire lens, in spite of the different curvature of the two surfaces, is more spherical than that of the adult. The figure represents a piece 0.75 *mm.* long, and 0.12 *mm.* broad from the equatorial region.

First, our attention is attracted by the varying thickness of the capsule. At the anterior pole, ten measurements give an average of 0.008 *mm.*, somewhat peripherically an average of 0.01 *mm.* In the equatorial region, shortly before the epithelial cells are placed obliquely toward the capsules, the thickness of the capsule is decreased to 0.0059, and opposite the vortex even to 0.0047 *mm.* Further backward, at a place which is still within the insertion of the zonula, the capsule grows thicker pretty rapidly, up to 0.024 *mm.*, and from there becomes gradually thinner, and over the greater portion of the posterior capsule is no thicker than 0.0018 *mm.*

The dimensions of the epithelial cells, and their insertion at the inner surface of the capsule, change with the locality. In the region of the anterior pole they are short hexagonal columns, with a diameter of 0.01 *mm.* at the base, and of the same height. They are, therefore, as broad and thick as the capsule at that place. The almost spherical nucleus of 0.005 *mm.* diameter lies in the centre of the cell. Toward the equator, where the capsule becomes thinner, the cells, whose diameter at the base is slightly increasing, become gradually higher, up to 0.018 *mm.*, the nucleus at the same time occupying the end toward the interior of the lens. At

the equator the cells become rapidly elongated, and are placed more and more obliquely toward the capsule; the outer end, turned backward and upon the section, forms the delicate vortex of the lens, the nuclei, at the same time assuming a more elliptical shape.

In the lenses of older individuals, the thickness of the capsule is considerably increased, the diameter of the cells at the base remains the same, and their height decreases.

The increase in length of the fibres at the vortex of the lens affects, therefore, especially that part of the cells which lies nearest the capsule. From our figure it is evident that the nucleus always retains the same relation to the upper part of the protoplasmatic cell-body, whilst the lower portion becomes elongated, at first vertically toward the capsule, then obliquely, moving backward. At first this portion remains still straight, but later, even before the part in front of the nucleus changes its form, the cells take the shape of an S. The last cell, which anteriorly (toward the interior) does not yet show any distinct increase, has, posteriorly from the nucleus, already a more than ninefold elongation. The first cell, which is elongated toward the interior, and which, with this end, covers the two adjoining cells, is posteriorly increased twelve times in length.

The nuclei of the cells at the vortex do not differ in size from the nuclei of the anterior epithelium, but they are more elliptical in shape and are placed vertically to the axis of the lens. Therefore, seen from the surface, the nuclei must appear smaller and nearer together, since the cells become, at the same time, somewhat smaller. But the picture which is produced by this, and which has frequently been misinterpreted, is not nearly so characteristic as that of the bullock. At any rate, our drawing shows that there is no accumulation of so-called formative cells (*v. Becker, Kölliker*) in the equatorial region.

As soon as the cells of the vortex begin to be elongated also at their anterior end, this elongation takes place much more rapidly than the increase at the posterior end, so that even at the sixth of these cells the nucleus lies in the cen-

tre of the fibre. This more rapid increase at the anterior end continues for some time, until gradually the posterior end increases more, and the nuclei then take their place at about the anterior third of the fibre.

This arrangement causes the nuclei of the nuclear zone to form at first an arch with the convexity backward (v. Becker), which, in our specimen, at the thirty-fifth nucleus passes over into an arch with its convexity forward and about parallel to the anterior capsule. For this double arch, in which the nuclei are arranged in a curved line which has been called nuclear zone, I propose the name of *nuclear arch*.

This nuclear arch, which, in a bullock-embryo of 54 cm. in length, for example, is still complete, that is, which meets the arch coming from the other side, does, in our specimen, not reach the anterior pole any more.

The nuclei at the vortex become more and more elliptical, and at the same time increase in size. In specimens which had been hardened in Müller's fluid, the nuclei show with hematoxylin and different anilin colors, at first a bright and uniform staining, no distinct nuclear figure being visible. Farther backward the contents of the nuclei become separated into isolated granules, which, though of bright color, are separated by a transparent substance. These granules become smaller and smaller, and finally disappear altogether.

A large number of these fibres can, in our specimen, be followed throughout their entire length. If it were still necessary to show that each lens-fibre contains only one nucleus, the irrefutable proof would be furnished by our specimen.

Also Henle ("Zur Anatomie der Krystalline," p. 15) declares that the gradual transition of the epithelial cells into the nuclear lens-fibres is sufficient to take away any doubt of the identity of the epithelial and fibrillar elements of the lens.

Our drawing shows that in the newborn the first and second of those cells, which are elongated also anteriorly, cover two; the third, three; the fourth, six; the fifth, eight; the sixth, nine; and from that every following fibre covers

about two epithelial cells. This comes partly from the fact that the lens-fibres at the centre have the same breadth as the epithelial cells at their base, namely, 0.01 *mm.*, with a thickness of 0.001 *mm.*, but that they terminate on both sides with considerably broader ends; partly, however, it is also caused by the oblique insertion of the fibres posteriorly.

The vortex and nuclear arch of the human lens vary considerably according to age. The number of those cells which are elongated at the base only, but not yet anteriorly, decreases with age. The oblique position toward the capsule which results therefrom, can in our drawing be followed up to the twenty-fifth cell. In a child four years old I found it in eight only; in a woman of forty-four and fifty-eight years there were about six; at the age of seventy-five only two to three. The first cell passing over the adjoining cells extended in the newborn to the second cell, in a child four years old to the fourth, in a woman of forty-four years to the ninth cell. The portion of the nuclear arch which is convex posteriorly, contains fewer and fewer nuclei; in the newborn there were about thirty, in a woman fifty-eight years old only about ten nuclei. Whereas, in the newborn about seventy fibres are turned outward with their concave side, in a woman of seventy-five the seventh fibre had its convexity outward. In the same manner, the number of those fibres which do not reach the radii of the star-figure decreases with age, but they do not disappear entirely. All these characteristics of the vortex and of the nuclear arch are always present, at least to a certain extent.

MICROPTHALMOS AND COLOBOMA IN A RABBIT.

By DR. H. HÖLTZKE,

ASSISTANT SURGEON OF THE OPHTHALMIC CLINIC AT ERLANGEN.

(*With three illustrations, figs. 1, 2, 3, plate ii.*)

Translated by R. O. BORN, M.D., New York.

THE eye of a rabbit with coloboma of the iris, ciliary body, and choroid and general microphthalmos, was given to me by Prof. Sattler, who also kindly encouraged me to publish the result of the examination.

The eyeball was removed from a full-grown rabbit. Externally we notice in the region of the posterior pole a hemispherical protuberance of the sclerotic, the size of a pea, which above and on the inner side reaches the short stump of the optic nerve. The diameters of the eye compared with those of the other (healthy) eye are: the sagittal diameter, 14.5 *mm.* to 17.5 *mm.*; the equatorial d., 15.0 to 19.0 *mm.*; the diameter of the cornea, 7.0 *mm.* to 15.0 *mm.* in the healthy eye.

The coloboma (plate ii, fig. 1) is downward, and extends through the entire breadth of the iris and ciliary body; the coloboma of the choroid is extended into the upper half of the globe and seems to involve the optic-nerve entrance. Its greatest breadth, immediately behind the equator, is 9.5 *mm.* Anteriorly, behind the region of the ciliary body, there is a small pigmented bridge, *b*, which connects the normal choroid on both sides of the defect.

The retina, which is detached to a great extent on both sides, does not show a distinct defect, except in the prolongation of the defect of the ciliary body, where it forms a sharply defined arch extending almost to the equator. Near the lateral margin of this retinal coloboma passes from the ciliary body backward and inward toward the region of the optic disc a prominent ridge, *l*, which, upon sections, shows two large lumina of blood-vessels. The sclerotic, which in the equatorial region is thinned, becomes excessively thickened toward the posterior pole, with several fissures in its walls, and with an excavation, *s*, on the lateral side of the vascular ridge. The depth of this ectasia does not extend through the entire thickness of the sclerotic, and does not correspond to the protrusion near the optic nerve on the outer surface of the globe. The optic disc cannot be seen.

A series of microscopical sections passing transversely through the coloboma shows (fig. 2) that the thickened posterior wall consists only to a small extent of sclerotic, the latter forming relatively large meshes which on both sides of the pole are filled up with atrophic fatty tissue and large blood-vessels; but at the pole itself, where the excavation was found, it was filled with a peculiar fibrillar tissue, which at once makes the impression of degenerated retina, and which in some places shows elements which resemble Müller's supporting fibres and ganglionic cells. The connection between this degenerated, hyperplastic retina and the surrounding cicatricial tissue is very intimate, and the transition is in many places very gradual. There is nothing which would correspond to the choroid. There is especially no trace of pigment in the excavation. The margins are formed by thickened and slightly prominent ridges of sclerotic.

On both sides of these thickened margins the retina consists of two separate layers, the inner containing the greatly developed basal portion of Müller's fibres and the layer of ganglionic cells, the outer layer consisting of remnants of both layers of granules. Beyond the excavation the ridges meet, and farther forward show upon cross-sections a thick-

ened sclerotic with more or less pigment cells and large lumina of blood-vessels. This part is covered only with a thin vascular membrane of connective tissue, the retina only approaching near to the ridge. We have, therefore, at this place a kind of retinal coloboma.

The choroid shows a different relation near the coloboma. Near the posterior pole the pigment-epithelium and the choroidal stroma suddenly stop, on the inner side, about 5 *mm.* from the ridge; only the suprachoroidal layer being continued a short distance toward the vertical meridian, but not reaching that place where the retina is divided into two lamellæ. On the outer side, the suprachoroidal layer shows the same relation; the other layers of the choroid can be traced to within 2 *mm.* from the outer margin of the staphyloma. Anteriorly the choroid gradually approaches the median line, and at the bridge *b* meets the choroid from the other side. At a level with this bridge appear the first ciliary processes, covered with a continuous layer of dark pigment and the pars ciliaris retinae.

The free margin of the iris is folded backward, but below the horizontal meridian; the sphincter has again its normal position at the pupillary margin.

Vertical sections through the optic-nerve entrance and the surrounding tissues (fig. 3) show no coloboma of the optic nerve. The central vessels are in the axis of the nerve. The blood-vessels in the lower part of the globe can only be followed to 2 *mm.* from the centre of the disc. The large size of the vessels in the ridge makes it improbable that they were derived from the central vessels of the nerve; besides, there are also cross-sections of other large vessels in the walls of the globe below the disc. The region of the disc and the disc itself are excavated. Below the papilla there are again several deep excavations in the cicatricial sclerotic, lined with degenerated retina. The greater portion of the disc is covered by a fold of retina; the remaining part is hidden by a structureless membrane which lines the entire surface of the retina. This membrane, probably the thickened inner limiting layer of the retina, reaches in some places the thickness of Descemet's membrane, and has on its inner sur-

face a net-work of capillaries and larger blood-vessels. In all the other parts of the eye also, the retina shows interstitial proliferation and atrophy of the nervous elements; in the upper half, especially, we find in some places dense connective tissue, pigmented in the outer layers, forming slight elevations which are covered by the other layers of the retina. In some places the pigment-epithelium is defective underneath these proliferations (fig. 3, *h*).

The explanation of the above-described changes is very simple. There have evidently been extensive inflammatory processes in the eye, and I see no reason why we should not adopt Deutschmann's view (*Klin. Monatsbl. f. Augenh.*, March, 1881), that the arrest of development is only a changed development of the eye in consequence of an intra-uterine inflammation. This inflammation has probably taken place in the latter half of the third week; the foetal fissure was nearly closed, or after having been closed, was again opened; the iris, on the other hand, had not begun to develop. Why this inflammation was just at this fissure, which is so important for the development of the eye, cannot be decided, unless it was favored by the greater vascularity of this neighborhood.

SYNCHYSIS SCINTILLANS.

By DAVID WEBSTER, M.D.,

PROFESSOR OF OPHTHALMOLOGY IN THE NEW YORK POLICLINIC.

THAT affection of the vitreous humor known as scintillating or sparkling synchysis, is, in New York, a comparatively rare disease. At the Brooklyn Eye and Ear Hospital only *two cases* were seen among the twenty-eight thousand eight hundred and sixteen (28,816) patients with diseases of the eye treated at that institution in the first fourteen years of its existence. At the Manhattan Eye and Ear Hospital, New York, *three cases* were found among the twenty-six thousand seven hundred and fifty-six (26,756) eye-patients registered there during its first thirteen years of work. Thus out of a total of 45,572 patients with diseases of the eye only five were found with crystals of cholesterine in the vitreous humor.

In India, according to Mr. Macnamara, formerly of Calcutta, now of London, the affection is much more frequently met with. He says: "Among the natives of India these appearances are sometimes seen in consequence of the lens having been thrust down into the vitreous in the operation of depression or reclinacion for the cure of cataract. We not unfrequently have patients applying for relief at the Ophthalmic Hospital under these circumstances, suffering from atrophy of the retina and choroid, together with sparkling synchysis." ("Diseases of the Eye," 1882, p. 397.)

The disease is well known to be due to degenerative changes occurring in the vitreous humor, though the causes of those changes, when not traumatic, are not always apparent.

The prognosis, when the disease is of traumatic origin, or accompanied by changes in the crystalline lens, optic nerve, retina, or choroid, is of course decidedly unfavorable. When of idiopathic origin and complicated the reverse seems to be the case. In the first case herewith reported, the patient is still actively engaged in work requiring the close use of his eyes, although seventy years of age, and although ten years have elapsed since he was known to have sparkling synchysis of both eyes. Of the subsequent histories of the other three cases I know nothing.

In regard to the management of these cases, no local treatment seems to be indicated. But in common with all chronic eye-affections I have no doubt that they may be benefited by attention to the general health. Of course the kidneys, the heart, and other important organs should be carefully investigated, and may furnish indications for general treatment.

The following four cases are extracted from the private case-books of Dr. C. R. Agnew, of New York, and are all of idiopathic origin, unless we except the third, as having been caused by concussion, the patient having been thrown from a horse twenty-three years before we saw her. If the disease of the vitreous was produced by the fall, we may learn from this case how long it may exist without producing any considerable impairment of vision.

The fact that an eye with a fluid vitreous which has undergone chemical changes resulting in the formation of numerous crystals of cholesterine may still retain vision $\frac{3}{8}$, seems to me a very remarkable one: yet in two of these cases the patient could read $\frac{3}{8}$ after waiting a few moments for the sediment to settle down out of the axis of vision; in a third the vision was $\frac{3}{8}$; and only in the fourth, where there were lenticular complications, was the sight very materially impaired.

Those who wish to study this disease more particularly are referred to:

1. Chambé: Contribution à l'étude du synchisis étincelant, 40 pages, avec une planche. *Thèse de Paris*, 1876.
2. Poncet: "Histologie du synchisis étincelant."

3. **Van den Bossche, E.:** Observation de synchysis étincelant. *Presse méd belge*, No. 32 ;
as well as to the text-books, in common use, on the eye.

CASE 1.—March 21, 1873. Mr. T., statesman, aged sixty, has had more or less pain on using his eyes for reading and writing, for a long time. About three weeks ago he was attacked, rather suddenly, with a mistiness of vision of both eyes. This haziness of sight has since remained about the same, and the pain in his eyes, has been more annoying than previously. He considers his general health fair for a man of his age. He smokes cigars excessively and indulges freely in snuff. Each eye has vision $\frac{1}{8}$, and both are emmetropic. He reads Jaeger No. 1 with his glasses.

Ophthalmoscopic examination reveals the presence of numerous crystals of cholesterine in the vitreous humor. On causing him to move his eye about rapidly and then to suddenly fix it, beautiful showers of sparkling crystals are seen slowly falling, and flitting past each other in various directions, through the vitreous, and thus gradually settling down into the bottom of the vitreous chamber. The crystals having settled, the fundus can be seen to be normal.

CASE 2.—April 4, 1876. Mr. M., aged fifty-two, a teacher in the public schools, says that his eyes have troubled him only within a few months. He has never used glasses for reading, and can still read Jaeger No. 1, with much apparent effort, at a distance of thirteen inches. Vision = $\frac{1}{8}$, each eye, and no improvement with glasses. Reads more comfortably with $+\frac{1}{4}$. No insufficiency of ocular muscles.

Ophthalmoscopic examination shows sparkling synchysis of the left eye.

CASE 3.—June 29, 1876. Miss A. C. C., aged forty, when seventeen years of age fell from a horse, and "injured her spine sympathetically." She was a patient of Dr. J. Marion Sims, and was confined to a sofa most of the time for twelve years. Her eyes have been weak ever since the injury. They suffer from a sense of heat after being used, in reading or sewing, for a short time, and from aching, darting pains. There is an hereditary tendency to weak eyes in the family. Each eye has vision = $\frac{1}{8}$, and Hm. $\frac{1}{3}$. Insufficiency of interni 6° at 1' and 2° at 20'. Presbyopia $\frac{1}{4}$.

Ophthalmoscopic examination shows numerous crystals of cholesterol in the left vitreous humor, not settling to the bottom, but apparently attached to a web-like structure, so as to make only slight excursions on moving and then fixing the eye. Some of the crystals seem to be embedded in the retina. Three or four are situated in the vitreous almost in contact with the optic disc. There is physiological excavation of both optic discs, with visible pulsation of the retinal veins.

CASE 4.—Sept. 16, 1878. Mrs. C. McD., aged seventy-six, one year ago first noticed impairment of vision, and for the last six months has not been able to read a word. She has a patch of xanthelasma at each inner canthus.

Right eye, vision = $\frac{3}{80}$.

Left eye, vision = $\frac{3}{80}$.

Ophthalmoscopic examination shows lenticular opacities in both eyes. In the right eye the whole vitreous seems to be studded with small, round, white dots, with a few glittering crystals scattered about among them.

CYSTIC TUMOR OF THE ORBIT REMOVED BY ELECTROLYSIS; RESTORATION OF VISION.

By J. L. THOMPSON, INDIANAPOLIS, INDIANA.

(*With two wood-cuts.*)

McNaughton, John, a bright little fellow of five years, was first brought to me on Oct. 7, 1882, for treatment. The left eye protruded, was turned outward and downward, and a growth was plainly to be seen above the *tendo oculi* and behind the upper eyelid. The eye could be readily turned outward and downward, but was very much limited in its action in the opposite directions. The pupil responded readily to light; and $V = \frac{2}{3}$ in the affected, and $\frac{2}{3}$ in the sound, eye. He did not complain of diplopia, nor could I, in any way, with or without prisms, cause the duplication of images; but he had already learned to hold his head to one side. With the ophthalmoscope, the fundus was seen to be normal, with refraction slightly hypermetropic. His father informed me that the family had only noticed that there was anything the matter with the eye for a few weeks, and then only on account of a slight irritation and occasional redness of the eye, for which they used an eye-water. They then consulted their physician, who sent him to me for further examination. On digital exploration I was convinced that the growth was of a cystic character, and situated far back in the orbit, and that it had existed much longer than they had supposed, from the fact of his having already learned to mentally suppress the image of the affected eye. In accordance with the above view, I wrote to their physician, requesting him to watch the case and to let me see it again in a few weeks, or sooner, if any change took place. In about two weeks the boy was again brought to me with the parts looking almost as when first seen, and again was he sent

home with the same request to their physician as before. On the third visit the parents seemed very anxious about their child, when I plainly informed them of the gravity of the case, telling them that in all human probability the eye would eventually have to be sacrificed before the tumor could be completely removed ; that we would first attempt a cure short of the destruction of the globe, but that they might prepare for the worst. As it was my intention to first try the effects of electrolysis, a photograph of the boy was procured in order that we might see what headway we were making after each application. The accompanying wood-cut is as near like the photograph as it is possible to make one.



FIG. 1.

In the interval of the child's visits to me, he was, unknown to myself, taken to my dear friend and teacher, Dr. E. Williams, of Cincinnati, who, as I am informed by the parents, and have since learned from the doctor himself, feared it was a malignant growth ; but he saw it only the one time, and was not informed that the case was under my care. Indeed, I never knew that any oculist had been consulted until four months after the operation had been made.

On the 14th of November, 1882, he was etherized, when a small exploring trochar (with canula) was thrust nearly two

inches into the growth, and upon its withdrawal, about three drachms of dark-looking fluid followed. As soon as this ceased to flow through the canula, the latter was connected with the positive pole of a Stöhrer's galvanic battery with twenty cells in action, and the current was closed with a covered moistened negative electrode on the corresponding temple. The closing of the current caused him to struggle very much, and it was opened until more ether was administered, when it was again closed, continued for five minutes and then discontinued. The withdrawal of the silver canula was very difficult, owing to its adhesion to the tissues, and it was found to have been nearly eaten through in several places. Considerable oozing of fluid took place after the operation was completed.

In three hours after the operation he was taken home (twenty miles) and placed under the care of his physician, who, for several days used iced applications continuously. Very great reaction followed, with inflammation and much swelling of the eyelid, but on December 13th, just one month from the time of operating, Dr. Payne (his physician) wrote me as follows :

"DEAR DOCTOR :—The eye has resumed *nearly* its normal position. Motion is perfect, and only a trifle of vascularity remains in the lids. It looks as if restoration to the normal condition was almost complete."

I have seen the case twice since, and find the eye to be perfectly straight, with $V = \frac{m}{x+x_1}$, and motion complete in every direction. The accompanying wood-cut is from a photograph taken April 17, 1883, and is a true picture of his present condition.

The above case brings up several questions concerning the application of the galvanic current, which I would very much like to see answered by the more able of the contributors to these ARCHIVES, who have had more experience with the remedy than myself. Indeed, I have never read of the cure of a similar tumor of the orbit by this method (though many may have been published). Often have I read of, and occasionally have I seen, tumors of other parts of the body cured by electrolysis, but in these cases needles could be passed into both ends of the tumor ; while in my case but one electrode could be applied to the growth. Doubtless, with myself, many who read this will ask : Were too many cells of the battery used in this case ? Some would give the successful result as an answer ; and yet one might

use the same treatment in another, apparently similar case, and such an inflammation of the cellular tissue of the orbit might follow as to entirely destroy vision, or cause an unsightly appearance of the eyeball.



FIG. 2.

Again : Was it by electrolysis ? or was it by the inflammatory action caused by the heating effects of the current upon the canula that cured the case ? or, was it by both of these combined ? These are points which one learns but little about in the many text-books one meets with on electricity, and yet they are the very ones concerning which we wish to know more. I therefore consider that every such case, treated as was the above, should be published, as it adds to the gradually accumulating experience of our profession, and thereby slightly aids in its development into, if not a science, at least an educated empiricism, the judicious practice of which, conduces very much to the happiness of our patients.

A CASE OF PULSATING EXOPHTHALMUS; LIGATION OF THE LEFT COMMON CAROTID; DEATH.

By DAVID COGGIN, M.D., SALEM, MASS.

Mrs. L., aged sixty-six, born in Ireland, presented herself at the Salem Hospital, Sept. 22, 1876, having a catarrhal conjunctivitis.

Three years later she returned with an acute inflammation of the left lachrymal sac.

Feb. 15, 1882, she appeared again because of noise in the left ear, which was annoying, especially at night. A chronic catarrh of both middle ears being present, it was supposed to account for the tinnitus. Catheterization was tried, and the potassium bromide with ergot was given. Patient of a full habit with the capillaries of face and conjunctiva dilated from beer-drinking. Health good, ordinarily. No blow or other accident had been met with.

Treatment followed, with some variations, till April 19th, with no relief from the noises. At this time complaint was made of loss of sight—left eye. Incipient cataract; no change in fundus observed; occasional pain in left eye and brow.

Slight convergence of left eye noticed with some protrusion, which was easily reduced. No impulse felt. May 8th, pulsation of eyeball now visible and recognized by palpation—it being more marked on pressing the globe back into the orbit. On separating the lids the eye protruded noticeably. External rectus paralyzed.

On applying a stethoscope on the eye, a loud bruit was heard, and also, in a less degree, when the instrument was placed on different regions of the head; but it ceased on pressing the common

carotid, and the patient exclaimed : " The noise in my head has stopped entirely." Heart sounds normal. (At this time there was no sphygmograph in the hospital.)

May 18th. Entered the hospital. Pressure-band on eye. Tinct. verat. vir., gradually increased till five minims were taken every hour, the pulse not going below sixty-five. Some relief was evidently afforded, as, on suspending it for twelve hours, the patient begged for it again, the distress in her head had so increased. Digital pressure on the carotid was attempted, at intervals, for two days, but was not tolerated longer than seven minutes ; neither was a tourniquet.

May 25th. By the advice of Dr. Wm. Mack, ether was administered to the patient and the tourniquet was applied and continued for fifteen minutes, when the slow and labored respiration and flushed face caused me to remove it.

June 1st. A consultation having been held with the other members of the staff, ligation of the common carotid was suggested and its risks explained to the patient. She consented to the operation, saying she could not live unless relieved of the noise in her head, which had become tormenting.

An examination of her urine the previous day had resulted in finding a few granular casts, after several trials. Under ether, Dr. Arthur Kemble ligated the artery at its upper part, and no bruit could afterward be detected with the stethoscope, while the eye receded somewhat. On recovering consciousness from the ether, the patient was rational, though she insisted she still heard a noise in her head. This may have been imaginary, or it may have been real, from the propagation of the wave from the basilar, but too feeble to be made out by the stethoscope.

June 2d. Mind wanders, but can be aroused, and counts fingers with left eye. Exophthalmus and congestion of conjunctiva less. Pulse 96, temperature 101.2° F.

Redness, pain, and swelling below wound in neck.

June 3d. State of stupor. Protrudes tongue on being asked. Shrinks and moans on touching wound. Pulse 100, temperature 101.5°.

June 4th. During the night, hemiplegia of the right side appeared. Tongue deviates to the *left*. Drinks readily. Pulse 115, temperature 101.5°.

June 5th. Pupils dilated. Face puffy. Respiration 50, pulse 150, temperature 103°. Died.

An autopsy was held on the same day.

Permission was obtained so late that, with the undertaker and the relatives of the deceased impatiently waiting in the adjoining room, the examination was, if not superficial, far from satisfactory.

There were found old pleuritic adhesions on the right side. Heart soft and collapsed as if fatty.

Two calculi in gall bladder ; kidneys small. Temporal, parietal, and occipital lobes of left hemisphere of brain much softened and friable. Venous sinuses normal, so far as seen.

After removing the roof, the contents of the left orbit were taken out, together with the eye.

Ophthalmic vein perhaps larger than usual. No aneurism of the ophthalmic artery (and there is no well-authenticated case of one on record).

Cause of bruit and pulsation not discovered. A part of the sphenoid and temporal bones was removed *en masse*. Some days later this was examined, when, on exposing the carotid artery, throughout its course in the canal, a marked aneurismal dilatation of the cavernous portion was revealed, which proved to be due to fatty degeneration.

A REVIEW OF THE THEORIES OF HEMERALOPIA,
WITH A CASE OF NIGHT-BLINDNESS FROM MIAS-
MATIC INFLUENCES, AFFECTING FOUR CHIL-
DREN OF THE SAME FAMILY.

By CHARLES ZIMMERMANN, M.D.,
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IN the beginning of last year Dr. Geo. Reuling, surgeon of the above institution, observed a small epidemic of hemeralopia (nyctamblyopia), evidently caused by miasmatic influences. As in regard to this kind of etiology the opinions of authors differ considerably, the publication of this observation may be of sufficient interest. On this occasion the present writer went over the literature of hemeralopia, and thought that a review of the different theories advanced in regard to this disease, especially its etiology, might not be unwelcome to the readers of these ARCHIVES.

The expression hemeralopia was not used until recently, though night-blindness itself was known even to the ancients. In the period before Alexander, night-blindness with other disturbances of sight, especially photophobia, were reckoned among nyctalopia. Celsus, agreeing with the Hippocratic physicians, meant by this latter term night-blindness, whereas Galenus used it in an opposite sense. The Egyptians (according to Pliny) knew both diseases. The Arabs followed Galenus. In the eighteenth century there was a difference between nyctalopia and hemeralopia, but this difference in regard to the confounded etymology of both words was often confused. Hemeralopia was considered a

form which we now would call "asthenopic amblyopia," and nyctalopia was considered a consequence of a state of irritation of the retina. In the nineteenth century hemeralopia was regarded as torpor of the retina caused by abnormal meteorological influences, as well as extremely bright light or congenital deficiency. In the second half of our century the expression was more clearly defined and divided according to its etiology, course, and objective conditions. Netter (*Lettres sur l'héméralopie et l'affection dite rétinite pigmentaire. Annal. d'ocul.* t. 75, p. 198), for instance, distinguishes between congenital and acquired hemeralopia. The congenital again is divided into a mild and a serious form, which accordingly were named idiopathic hemeralopia and retinitis pigmentosa. Both are only different degrees of the same disease. The hereditary form may be considered as resembling the congenital, described by Pagenstecher (*C.f. A.*, August supplement, p. xi, und *Berichte der II*; *Heidelberger Versammlung*, p. 149). This author found hemeralopia hereditary in a family for many decades affecting only its male members after passing one generation over.

The acquired night-blindness is observed in two forms, the symptomatic and the idiopathic one. In the latter are included all cases in which there are no certain ophthalmoscopic alterations, and for which no certain causes can be found. Therefore, the epidemic form was placed in this category. The symptomatic night-blindness, however, seems to be the most common as a symptom (1) of a certain eye-disease, or (2) of a general affection of the body. By this division the different descriptions of the ophthalmoscopic conditions in hemeralopia are explained. If hemeralopia is joined with other diseases of the eye the ophthalmoscopic changes of these diseases will be found, and in those cases hemeralopia will be a functional disturbance only. No alteration of the fundus is found, when night-blindness is idiopathic or when caused by general diseases of the body. In congenital hemeralopia, the same condition is generally observed, although in some cases degeneration of the retina will be found. The special eye-diseases with which hemeralopia sometimes is connected are the following:

1. Affections of the conjunctiva which may give rise to its development. Snell (On a peculiar appearance of the conjunctiva in some cases of night-blindness. *Lancet*, Jan. 1, p. 8) found whitish-gray patches in the conjunctiva of the eyeball on both sides of the cornea or only on the outer margin. These patches consisted of little blisters which followed the movements of the conjunctiva, disappearing by pressure but returning after some hours. The epithelial layer was not thickened. This affection appeared and disappeared together with the hemeralopia. The fundus of the eye was normal, and in some cases the vessels appeared slightly blurred. Only children were attacked, and especially those of a healthy constitution. The cause could not be found out. Snell never saw a case of hemeralopia without this conjunctival affection. According to Saemisch (*Handbuch der Augenheilkunde*, Bd. iv, p. 133), hemeralopia and xerosis conjunctivæ are undoubtedly connected, although an exact explanation of this connection cannot be given. The same is observed by Bitot (*Mémoire sur une lésion conjunctivale non encore décrite coïncidante avec l'héméralopie. Gaz. méd.*, 1863, p. 435) in twenty-nine cases. Villemin (*Gaz. méd.*, 1863, May 21) explains this connection in the following way: The remainder of the epithelial scales covering the cornea obscure its transparency so that twilight and artificially diminished illumination cannot penetrate. Netter (*Gaz. méd.*, 1863, p. 505. *Mémoires sur les taches blanches des sclérotiques dans l'héméralopie*) does not agree with this, but he thinks that the epithelial scales are caused by the bright light of the sun, and this of itself causes hemeralopia. A similar observation is made by Adler (*Klin. Monatsbl. für Augenheilkunde*, p. 91). Among a hundred deaf children in an asylum twenty-three suffered from idiopathic hemeralopia; twenty of these had conjunctival ophthalmia and triangular xerotic patches on the conjunctiva bulbi close to the periphery of the cornea (Bitot's spots). These patches were dry and glittering like silver, and gently rising over the surface of the conjunctiva. The laceration of the fatty-degenerated epithelial layer resembled fish-scales. Thirteen suffered

from xerophthalmia without hemeralopia. Adler thinks that in these cases hemeralopia and xerosis were caused by the bright light to which the pupils had been exposed. By others, for instance Weiss (*Berliner klinische Wochenschrift*, 1873, pp. 232-234), an affection of the conjunctiva is regarded as an appearance belonging to hemeralopia. In slight cases of this affection the conjunctiva of the lids appears only somewhat injected; in more serious ones the eyeball participates. Afterward, a triangular-shaped piece of the conjunctiva becomes glittering like mother-of-pearl, generally on the external margin but sometimes on the inner part of the cornea. The base of this triangle is turned toward the cornea, the apex toward the canthus. In a later stage the patches above mentioned change their appearance in such a way that they resemble chalk. Weiss found on microscopical examination that these particles, which were caused by the rubbing of the lids against each other, consisted of detritus. In regard to these different opinions about the affections of the conjunctiva in cases of hemeralopia, it is considered partly as a complication, partly as an affection constantly found whenever hemeralopia is observed. It seems that in cases in which the disease of the conjunctiva does not reach the cornea, the supposition of a connection between the two diseases is not probable, whereas the opinion of Villemin above mentioned is very likely correct.

2. According to Foerster (*Graefe's Archiv*, Bd. xx, p. 41), in choroiditis syphilitica the most constant symptom is the insensibility of the retina, viz., hemeralopia. In Graefe-Saemisch's hand-book (Bd. iv, p. 629), the same is mentioned in cases of chorio-retinitis specifica. Schoeler (*Deutsche Klinik*, 1874, pp. 11-13) communicates a case of a very rapid development of myopia in acute sclerotico-chorioiditis, of which the most striking and first symptom was night-blindness. In the outer side of the optic disc, with which is connected a very pale circular zone, about one and a half or two centimetres in diameter, there are slightly developed glittering crescents of the sclera. The circumference of the optic disc is sharp, the color does not differ

much from the white of the neighboring choroid. After one year, myopia had increased with progressive atrophy of the choroid, hemeralopia continuing. Fitzgerald (*Irish Hosp. Gaz.*, Jan. 15, 1873) describes congenital hemeralopia in cases of myopia ($\frac{1}{2} V = 1$) without any ophthalmoscopic alteration. Staphyloma posticum (myopia $\frac{1}{2} V. r. \frac{2}{3}$, V. l. $\frac{2}{3}$), with congenital hemeralopia, was found by Leber (Graefe-Saemisch's hand-book). On the left side of the yellow spot, discoloration of the pigment, with some irregular patches, was observed. The choroidal vessels could be seen everywhere on a dark ground.

Koenig communicates, in his dissertation, two cases of imperfect development of the choroid, in which hemeralopia was the chief functional symptom. Upon examination with the ophthalmoscope, the capillary layer of the choroid could only be discovered at the yellow spot, which looked red. The whole remaining fundus was seen as a white surface, interrupted by a few pigmented patches. Over these the retinal vessels took their course, and only a few larger choroidal vessels emerged there. The optic disc itself was bright red and sharply defined.

3. In diseases of the retina hemeralopia is found, especially in retinitis pigmentosa. According to von Graefe (*Graefe's Archiv*, Bd. iv, p. 250), hemeralopia constitutes, in fact, its characteristic symptom. It makes its appearance in the very first stage, together with concentric contraction of the field of vision. In most cases of congenital night-blindness this retinal disease is likewise met with. A deposit of pigment, however, never takes place very soon after birth (Leber, in Graefe-Saemisch's hand-book, v, p. 648). The hemeralopia is caused by congenital atrophy of the retina, to which, in a later stage, pigmentation is added. Leber thinks that the ophthalmoscopic examination is not sufficient for determining exactly whether there may not be some masses of pigment strewn about the retina in such a slight degree that they cannot be noticed.

This is proved by Poncet (*Annal. d' ocul.*, 24, pp. 234-239). A man twenty-one years of age, suffering from congenital hemeralopia, died of scarlet-fever. The anatomical exami-

nation of the eye was made, and there was found a deposit of pigment in the deeper layers of the retina, especially the external granular layer. This could not have been proved before with the ophthalmoscope.

Perhaps all cases described as "retinitis sine pigmento" might show the same condition by examination with the microscope.

Guaita (*Annali di ottalm.*, iv, pp. 135-139, observations made in Quaglino's hospital) saw hemeralopia after previous neuro-retinitis, and considered it as a congenital form. In the retina no deposit of pigment could be discovered. The optic nerve was pale, the arteries of the retina small. The pigment of the choroid and retina was rarefied, especially near the equator. The characteristic ophthalmoscopic conditions in epidemic hemeralopia are described by Netter (*J. c.*), according to the examinations of Quaglino, Martialis, Poncet, and Galezowski, in the following way: Contraction of the peripapillar arteries, enlargement of the peripapillar veins, and circumscribed œdema of the retina. The optic disc, as the centre of the retinal circulation, is encircled at its periphery by pigment. The girdle of pigment thus formed may vary in its thickness according to the influence of light—and consequently the circulation of blood in the retina is regulated by the quantity of light falling upon it. The retinal vessels become smaller with the diminution of the pupil and larger with its dilatation. Continued illumination of the eye with a coal-oil lamp produces diminution of the size of the vessels and œdema (Mormoyer). He thinks the epidemical hemeralopia is caused by the stimulating light of the sun, which produces deposits of pigment similar to those on the skin; the symptoms just mentioned make their appearance under the influence of the sunlight. Retinitis pigmentosa would arise undoubtedly from the continued maceration of pigment deposited around the optic disc and effected by the œdema. Thus, by diffusion pigment-particles are diffused to other parts of the retina and set up circumscribed inflammation, which finally leads to adhesions between choroid and retina and to infiltration of the latter with pigment.

Schweigger also ("Vorlesungen über den Augenspiegel," p. 113) has noticed the presence of hemeralopia and contraction of the field of vision in children before the appearance of any pigment in the retina. But in all these cases there was a marked contraction of the retinal arteries, whilst the elder children of the same family had retinitis pigmentosa. He also observed in older persons hemeralopia and contraction of the visual field without any trace of pigmentation of the retina or any other symptom—except contraction of the arteries and paleness of the disc. Therefore, he thinks that this torpor of the retina is in all probability not due to the pigmentation of the retina, but to the obliteration of the vessels or of their calibre through hypertrophy of their coats, so that the retina obtains a diminished and insufficient supply of blood. Poncet (*Épidémie d'héméralopie, Gaz. des hôp.*, 1869, 29) gives the following description of the ophthalmoscopical condition as a completely characteristic one: Anæmia of the arteries of the retina, which become extremely contracted and pale, and show double contours close to the disc. The veins are dark and swollen. The disc is often red and slightly engorged. Œdema of the disc and the retina (which is observed by Italian physicians), though frequently met with, is not pathognomonic. It makes its appearance either along the anæmic vessels or on the margin of the disc.

In all these eye-diseases just mentioned, of which night-blindness is observed as a symptom, retinitis pigmentosa seems to be the only one with which hemeralopia is constantly connected. The observations about all the other affections are, on the one side, not numerous enough to give sufficient evidence; on the other side, they contemplate hemeralopia as a consequence of those diseases, whereas it appears more probably independent of them, produced only by the same influences. These influences are found in a simpler manner in general diseases and disturbances of nutrition. In those cases the fundus of the eye does not show any peculiar changes.

1. The most frequent of these diseases were those of the liver. According to Fumagalli (*Sulla patogenesi dell'em-*

eralopia essenziale. *Annali di ottalm.*, ii, pp. 271-494), hemeralopia consists in affections of the liver. He found in patients suffering from night-blindness, signs of icterus. The retina had a grayish reflex and was oedematous. The arteries were narrow, the veins swollen, the epithelial pigment was darker than usual. He gives the following explanation:

Cholæmia, caused by the affection of the liver, diminishes the nourishment of the tissues, retards the circulation of blood, thus producing arterial ischæmia, venous stasis, and serous exudation. The coloring matter of the bile circulating in the blood, is deposited in the epithelial pigment layer of the retina. On account of the interrupted nutrition of the cones and rods, a very bright light is necessary to be perceived by the retina. Perinaud (*De l' héméralopie dans les affections du foie et de la nature de la cécité nocturne. Arch. génér. de méd.*, April, 1881) says that hemeralopia is not rare in diseases of the liver, especially in chronic forms—for example, in cirrhosis. The cause must be sought, not in the coëxistent icterus, but in the alteration of the blood, the result of the affection of the liver and the functional disturbance produced by it. By Kotten (*Recueil d' ophthalm.*, p. 185, 1879) hemeralopia was observed, together with xanthopsia, in general icterus, which occurred three months after an abortion. Xanthopsia diminished suddenly, hemeralopia persisting.

Litten (*Zeitschrift f. klin. Medicin*) found in two cases of cirrhosis hepatitis pigment degeneration of the retina. In nine cases of various affections of the liver he detected hemeralopia without any evident retinal change.

2. Affections of the kidneys sometimes produce hemeralopia. A man confined to bed for months on account of diffuse nephritis, albuminuria, dropsy, became hemeralopic without being exposed to bright light. Therefore, Förster (who observed this case) concludes that certain anomalies of nourishment and blood are necessary conditions for the origin of night-blindness. In a similar way, hemeralopia, with women in the last weeks of pregnancy, is produced, according to Litzmann, by an affection of the kidneys corresponding to retinitis albuminurica and uræmic amaurosis.

3. Hemeralopia has been seen in children after irritation by helminthiasis; and, furthermore, in children whose parents were blood-relations.

4. Authors generally agree that malnutrition is most prominently the cause of epidemic hemeralopia, inasmuch as in all cases insufficiency of food-supply or impoverished condition of the blood was observed. Even in cases without any exposure to bright light, as, for instance, among the sailors of an Arctic expedition during the long winter night, hemeralopia has occurred (Weiss: *Berliner klinische Wochenschrift*, p. 232). The epidemics of hemeralopia among the garrison of Strassburg began almost regularly in March, and disappeared in April, in which months the sun has no great power. We not unfrequently find hemeralopia existing among people on long sea-voyages. This is not so much the consequence of exposure to the tropical sun as more probably the scarcity of proper food and the malnutrition following it. Many of them were suffering from scurvy (Soelberg-Wells: "Treatise on the Diseases of the Eye"). In epidemics among the army, only the soldiers are attacked, not the officers and sub-officers, who enjoy a more generous diet. In Brazil mostly the slaves are disposed to this disease. In Germany and France it sometimes breaks out epidemically in prisons, schools, military camps, etc. In England and Scotland, where even the lower classes enjoy a more generous meat diet, the disease has never been observed epidemically. (Falk: *Schmidt's Jahrbücher*, 159, p. 290). In the cloisters of Poland, epidemic hemeralopia often occurs in the days of fasting before Easter (Fritsch: *Note sur l'héméralopie*. *Lyon médical*, p. 565). The same is observed by Grosoli (*Annali di ottalm.*, ii, p. 24), in a college of nineteen boys near Modena. There, for three successive years, hemeralopia broke out epidemically in the days of fasting. Bunke (*Virchow's Archiv*, 52, p. 570) observed an epidemic of night-blindness among the French captives in Lingen. He thinks the cause to be the over-stimulation of the retina by extremely bright light. But it seems that the crowding together in barracks was the reason of the epidemic.

Another proof for the theory of malnutrition as the cause of this affection is found in the beneficial effect of a tonifying treatment. Under the administration of tonics like quinine, iron, cod-liver oil, strychnia, galvanism, and the enjoyment of a generous diet, epidemical night-blindness generally disappeared rapidly. The connection between nystagmus, frequently observed in miners, and hemeralopia (Nieden: *Berl. klin. Wochenschrift*, No. 47), seems to have its origin in the fact that hemeralopia produces the nystagmus. Hemeralopia occurs often in miners, on account of their occupation in the confined and vitiated atmosphere of mines. Since hemeralopia is generally accompanied by a considerable contraction of the field of vision, patients affected by this condition have to move their eyes constantly in order to gain the largest possible field of vision. This very often leads to real oscillations of the bulb (nystagmus).

Miasmatic influences are, however, not mentioned as important causes of hemeralopia, or, if they are spoken of, their agency is denied (Falk, Leber). Our case furnishes, as I think, a convincing and striking instance for this kind of etiology, which seems as important and is perhaps more frequent than hitherto supposed.

Our case was observed in a family consisting of the parents and four children, who previously were all healthy. After leaving their residence and taking a house in a low situation and close to a sewer, the father suddenly fell ill from typhoid fever, and the children were attacked by intermittent fever together with hemeralopia. On examination with the ophthalmoscope no alteration of the fundus could be found. No other cause could be pointed out than the influence of the malarial emanation. The fever disappeared after administration of quinine, the night-blindness persisted despite treatment with iron and other tonics. It was only after the family had left this house and taken another one in a higher situation, in a very healthy quarter of the city, that a rapid improvement was observed. In about a fortnight all the children recovered from their hemeralopia without any treatment, and the affection never returned.

The fact that all the children simultaneously were taken sick after exposure to miasmatic influences, and the fact that the disease disappeared directly after removing the children from the unhealthy locality, show very clearly how much importance is to be attributed to miasmatic influences in the etiology of hemeralopia.

A CASE OF TRAUMATIC PULSATING EXOPHTHALMUS,
PARTIALLY CURED BY LIGATURE OF THE COM-
MON CAROTID (DR. H. B. SANDS), TOTALLY CURED
BY EXTIRPATION OF THE ANEURISMAL VARIX
OF THE ORBIT.

By H. KNAPP, M.D., NEW YORK.

SINCE Prof. H. SATTLER of Tübingen published in *Græfe-Sämisch's Handbuch*, vol. vi, pp. 745-948, his admirable monograph on pulsating exophthalmus, compiling all the cases, 106 in number, known up to that time, 1880, a few other cases have been published, viz., one by A. Nieden, *Arch. f. Augenh.* (German edition of these ARCH.), vol. xi, p. 641, etc., 1881, the observation of which, however, is not completed; one by J. R. Wolfe, of Glasgow, in his text-book on Diseases of the Eye, Glasgow and Philadelphia, 1882, p. 381, etc., and one quite recently (*The Lancet*, vol. ii, 1882, p. 799), by Walter E. Lloyd, of Bristol, England, under the title of "A case of intra-orbital aneurism, following fracture of the anterior fossa of the base of the skull and meningitis; ligature of the common carotid six days after accouchement; extirpation of the eyeball; recovery." In the latter case, the exophthalmus made its appearance six weeks after the injury, the sight and hearing on the affected (left) side began to fail, and a constant loud whirring noise was complained of. A loud bruit was heard over the frontal and left temporal bones, and over the left eyeball which was distinctly pulsating; both murmurs ceased when the common carotid was compressed. The woman was seven months and a half pregnant, on account of which

the ligation of the common carotid was postponed. After her delivery at the regular term, the symptoms from the previous fall, as in Nieden's case, became so much worse from day to day, that six days after delivery, Dr. Lloyd ligated the common carotid. The wound healed kindly, the blindness and deafness on that side disappeared, the exophthalmus diminished, and the noise was scarcely perceptible. This is the ordinary course of such cases, ending in recovery. The further progress, however, was remarkable. At times there were acute pains in the head, the sight of the left eye was gradually destroyed, the crystalline lens opaque, and the eyeball pushed forward by what appeared to be a blood-clot. The bruit became louder, chiefly over the mastoid process and the occiput. The sight of the right eye being threatened by the condition of the left, Dr. L. enucleated the left globe. No unusual hemorrhage. "After removing the eyeball, I passed my finger into the orbit, and could feel a firm but somewhat elastic mass at the back." The wound rapidly healed. The patient went to the country, and returned home in perfect health.

I have given an abstract of this case, because it has one important feature in common with the case I am about to report, namely, the ligation of the carotid improved the exophthalmus only temporarily, and the eyeball had to be removed afterward. The author reports the case as cured, but I would ask him, in the interest of science, to make, after some time, a supplement to its history, telling us, what has become of the firm but somewhat elastic mass which he left at the back of the orbit. Did it shrink or increase? The time elapsed since the operation is too short to terminate the history of the case by the word recovery. The carotid was ligated on Oct. 10, 1881; the eyeball removed July 6, 1882; the case was published Nov. 11, 1882, so that only four months intervene between the removal of the eyeball and the publication of the article. In the case reported below, the ligation of the common carotid cured all the symptoms consequent upon the injury, except the exophthalmus, which was temporarily improved, but in the course of two years increased so much that the cornea was destroy-

ed by exposure, and a cure effected only by the extirpation of the globe and a large pulsating mass which filled the whole orbit and protruded considerably beyond it.

The history of the case is as follows:

Mrs. K. C. Barrett, of New York, presented herself at the New York Ophthalmic and Aural Institute, Nov. 19, 1880. She was forty-eight years of age, and gave the following history: She had always been well until September, 1873, when she was struck on the left temple with a club by a woman, who had been drinking wine with her. She was somewhat out of her mind for several days, not knowing anybody. In the course of three weeks she recovered her senses. The injury caused complete left-sided facial paralysis, which has never entirely disappeared. Soon after the hurt, the eyelids were swollen, the eye protruded, but was pushed back by her physician. The eyelids could not be closed, but the sight was good. In the course of months she heard a throbbing, whirring noise in the left side of her head. It was constant, grew steadily more intense, and caused her the greatest distress. Six months or a year after the injury—she does not exactly remember when—the eye was distinctly pushed forward; toward the end of the first year the blood-vessels in the lids began to dilate, and continued enlarging steadily ever since; the veins in the adjacent regions of the eye participated in the process to a very great extent. About four years after the injury, the vision of the left eye began to be impaired, and in two years more was reduced to quantitative perception of light. When she came to the clinic, seven years after the injury, she presented the following condition:

The eyeball protruded so that the lids could not be closed over it. The protrusion was directly forward and somewhat downward. Mobility preserved, but limited in all directions. Tension, cornea, iris, and pupil normal. The lens was opaque (*cataracta matura*), perception and projection of light good. The lids blue-red and greatly swollen. The lids, temple, forehead, nose and upper part of the cheeks were pervaded by a dense network of tortuous and dilated blood-vessels, some red, some bluish, varying in size from a thin straw to a large quill, all of them pulsating visibly. The skin through which the dilated vessels passed was swollen and red, the whole was a repulsive picture of great disfigurement. The facial paralysis was still marked. The pulsation was imparted to the eyeball and could be felt everywhere.

With the stethoscope aneurismal whirring was heard wherever the blood-vessels were distended, most markedly over the upper lid. The same bruit was audible and well pronounced in the mastoid and temporal regions, and, though fainter, over the other parts of the skull. The hearing was good and had never been affected. The other eye was normal in position, structure, and function.

From the history and the present condition, the diagnosis of **traumatic pulsating exophthalmus, due to arterio-venous communication in the left cavernous sinus, after a rupture of the internal carotid** was unhesitatingly made, and was strengthened by the fact that compression of the left carotid stopped the noise in the mastoid region, and diminished but did not entirely remove the pulsations in the face. I did not expect any benefit from methodical compression of the carotid, but thought ligation of the common carotid indicated. I sent her to Dr. H. B. Sands, who was of the same opinion, and at my request was kind enough to take the surgical part of the case under his care. At the New York Ophthalmic and Aural Institute he "tied the left common carotid on Nov. 29, 1880; a carbolized catgut ligature being applied to the artery just above the omo-hyoid muscle. No spray was used; but the wound was washed with a solution of carbolic acid (1-20), closed with silver sutures, and covered with the usual Lister-dressing. No bleeding vessel required a ligature during the operation, and no drainage tube was inserted. The wound healed throughout by the first intention.

"Immediately after the operation, a faint systolic murmur could be heard by placing the ear over the left eyeball, and forty-eight hours later, feeble pulsation was detected in the vessels above the orbit. Neither murmur nor pulsation was entirely checked by compressing the right common carotid."

In the course of a year the swollen blood-vessels in the face gradually diminished in size and disappeared. The patient felt very much relieved, but the orbital part of the disease was only temporarily improved. During the summer of 1882, its growth took a new start. The eyeball protruded so much that the lids could not be closed over it, an ulcer developed on the lower part of the cornea, which, in spite of all precautions, led to total sloughing. The upper lid was distended by irregular, red, vermiform intumescences; the same, in a less degree, was noticed on the inner and lower sides of the orbit. This swelling was fully 3 *cm.* beyond the level of the other eye, measured 5 *cm.* in the

vertical and a little less in the horizontal diameter. Pulsation was felt in all parts of the tumor and was imparted to the eyeball; the finger pressing on the tumor was raised and depressed in corresponding rhythm. Distinct aneurismal bruit was heard over the whole tumor.

The steady increase of the "orbital aneurism" during the last six months, the complete exposure of the eyeball, in which, after the sloughing of the cornea, panophthalmitis was imminent, seemed to necessitate the removal of the globe. The patient readily consented to this operation, and, further, gave us discretionary power to take such measures concerning the tumor as, after the enucleation of the globe, we should find expedient.

I performed the operation with the kind assistance of Dr. Sands and the staff of the Hospital, on October 12, 1882. The enucleation was made in the usual manner, though with great caution, so as not to cut into the parietal leaf of Tenon's capsule, which might have opened one of the many dilated blood-vessels. In this way the removal of the globe was completed with scarcely any hemorrhage.

On palpation the whole orbit and adjacent region was found to be filled with an irregular, but connected, pulsating mass, no part offering any particular facility for ligation. I, therefore, thought it possible and best to remove the tumor as a whole. After enlarging the palpebral fissure toward the temple by an incision through the skin, I carefully dissected the large blood-vessels in the upper part of the tumor from the overlying skin, with cautious strokes of the scissors, as is done in the operation for incarcerated hernia. When I had proceeded to the orbital margin, I found that the vascular mass pressed directly against the bony walls, yet was separated from them by the periosteum and a thin layer of connective tissue, into which I burrowed with squint scissors, protecting the vascular structures with my finger. Proceeding cautiously, I found that in the depth the connection between the tumor and the orbital wall was looser, and could be severed with the sharp handle of a scalpel. Penetrating in this way at the outer-upper corner into the depth of the orbit, I found that near its apex the tumor contracted into a single resistant, pulsating vessel, about as thick as my little finger. As it could be easily compressed against the bony wall of the orbit, and in case of need be tied, I felt sure that the hemorrhage was under control, and I proceeded with more assurance to free the vascular

mass from its surroundings. Once the tumor was cut into and bled profusely, but the hemorrhage was immediately arrested by compressing the above-mentioned afferent trunk. This compression for the sake of safety and convenience, was continued during the rest of the operation, which, therefore, required less caution, and could be done more expeditiously. When the whole tumor was separated from its surroundings, a ligature was placed around the pedicle as near the apex of the orbit as possible. Then the pedicle was cut, as I thought, behind the ligature, but it was found that the thread was cut also. The distal end of the pedicle consisted of a large gaping blood-vessel, to which the clearly visible proximal end corresponded. We all were astonished to notice that it did not bleed, yet, for precaution's sake, a ligature was passed around it.

The contents of the orbit had been cleanly removed, so that on all sides the shining periosteum was visible. The extension of the outer commissure was closed with two silk sutures, the wound cleansed with sponges and ordinary water, covered to its whole extent with gold-beater's skin, and filled with a thick pad of absorbent cotton, held by a flannel roller. The operation had taken an hour and twenty-five minutes, the patient being constantly under ether. It was accompanied by very moderate hemorrhage, and followed by none.

Twenty-four hours after the operation the dressing was removed; it was soaked with blood and smelled offensively. The cavity was washed out by means of a fountain syringe with a weak (about one-half per cent.) solution of carbolic acid, and covered with a pad of absorbent cotton. The next day, no smell; the wound looked healthy and clean; no redness or swelling at its edges; no fever. The same cleansing of the wound was done twice daily. The stump of tissue at the apex of the orbit mortified and fell off. There was no smell from the wound and no discharge, but a scant secretion from the clean granulating surface. The cavity of the orbit became steadily smaller, but did not close altogether. A small recess remains which looks like the cicatricial mucous membrane in cases of old trachoma. It is whitish-red and moist, secreting a small quantity of muco-pus, which the patient has to wash out twice daily. The edges of the lids are somewhat overhanging the cavity.

I should not omit to mention that three weeks after the operation, when the recovery was proceeding favorably, the patient

suddenly had an epileptiform attack ; her body was stiff, the face livid, the mouth foaming, the extremities jerking, unconsciousness complete. She became quieter after a subcutaneous injection of chloral hydrate, made by Dr. B. Scharlau. Her mind was feeble and rambling for two days after, and she had no recollection of the attack. Her relatives said that she had had similar attacks before the injury, and one after it.

At present, almost eight months after the last operation, she feels quite well. Her mind is much steadier than before. The vascular swellings which disfigured her face so much have all disappeared. The skin of her face is clean and smooth, and her complexion is healthy. There is no noise in her head ; and the hearing on both sides is equal and about normal. The tympanic membranes normal. The other eye is good. She makes her living by washing and sewing, which she can do without inconvenience.

The mass of the removed tissue was examined after having lain in Müller's fluid two days. It formed a round tumor, 55 *mm.* in diameter, 22 *mm.* in height. At the posterior end was the normal optic nerve, transversely cut. Its sheath and subvaginal space were normal. The exsected orbital portion of the optic nerve was 13 *mm.* long, and broadened toward the eyeball. Tenon's capsule, out of which the globe had been enucleated, showed a plain, smooth surface, without any orifices of blood-vessels. Near the optic nerve was a large blood-vessel, its calibre 6 *mm.* in diameter, its walls fully 1 *mm.* in thickness, and smooth and shining at their inner surface. This was the afferent blood-vessel, cut near the optic foramen. It dilated into a bag-like cavity, a part of whose wall was smooth, another rough, from old deposits of coagulated fibrine. The cavity had two outlets, viz.: one larger blood-vessel passing around Tenon's capsule into the anterior tissues of the orbit ; another vessel branching off at right angles, connected with another large cavity, fully 2 *cm.* in diameter, the walls of which were, like that of the first cavity, partly smooth, partly rough, from fibrinous deposits. A thin-walled blood-vessel, about the size of a quill, passed into the soft tissue. Near by was an empty sac, evidently a blood cavity, the outlet of which, however, could not be found.

Sections in different directions through the bulk of the tumor, brought to view adipose connective tissue, muscles, here and there a nerve trunk, and a number of smooth, thin-walled, vascular cavities, some of which were divided and subdivided by delicate and smooth partition walls, presenting the typical structure of a cavernoma. The thin walls of some of these cavities were suffused with blood, their inner surfaces smooth and shining like a serous membrane. Between the two larger cavities described above, a compact nodular tumor was situated. It was the lachrymal gland, and showed no abnormality of structure.

Remarks.—It is needless for me to discuss the disease of which this case forms an example, after Sattler has described it so exhaustively. I only desire to point out what is unusual in our observation.

1. The time for the development of the pulsating exophthalmus, from six to twelve months, is longer than in most cases, yet not unprecedented, and is explained according to Sattler, by the presence of a small or imperfect rupture of the internal carotid, which gradually extends and leads to the full development of the symptoms. The time of development was seven years, unusually long also, and the dilatation of the blood-vessels was, it seems, as great in degree and area as in any of the cases on record.

2. The ligation of the common carotid had no very striking immediate effect, except that it stopped the subjective noises. The pulsation and bruit in the dilated vessels of the face slowly diminished and disappeared, the vessels of the orbit diminished only for several months, then they slowly increased again, and two years after the operation they increased rapidly, especially those along the eyebrow, and a large bluish thin-walled vessel at and below the inner commissure; they pulsated strongly, as did the whole mass of orbital tissue, which protruded considerably beyond the base of the orbit and caused the cornea to slough.

3. A relapse of the disease thus being manifest, and showing an alarming rapidity of progress, its arrest was deemed of vital importance for the patient. Among the

different methods recommended and practised, I chose the one, extirpation, which I find mentioned in Sattler's compilation of one hundred and six cases only three times, namely: 1, Morton's case (Sattler, No. 70), excision of the whole contents of the orbit, excessive hemorrhage, arrested by glowing iron and compression; recovery; 2, Frothingham's case (Sattler, No. 80), ligation of common carotid, retardation of increase for three years, then rapid growth; extirpation with very considerable hemorrhage; 3, Hansen's case (Sattler, No. 106), ligation of common carotid; return of symptoms as early as the second day; three weeks later, extirpation of the tumor with preservation of globe; profuse hemorrhage, arrested by per-chloride of iron. Frothingham's case was a pulsating angioma, Hansen's, a pulsating adenoma of the lachrymal gland, with enormous dilatation and hypertrophy of blood-vessels.

4. The nature of the relapse in our case was of two kinds: the bulk was an **aneurismal varix**, the smaller part a **pulsating cavernoma**, the mode of development in both, I think, was the same. It seems most probable that, by the ligation of the carotid, the perforation of the internal carotid had been diminished, but not completely blocked. The afflux of arterial blood from Willis' circle was sufficient to cause the continuation of the pulsation in the orbital veins, but not in the facial. The study of the literature, especially that of Nélaton's cases, leaves no doubt that the large pulsating vessels were dilated veins with thickened ("arterialized") walls, and not arteries. I refer the reader to Sattler's monograph.

5. The large afferent blood-vessel, which was cut at the apex of the orbit, was the superior ophthalmic vein. Evidence of this is furnished by the autopsy of the second case of Nélaton, described and illustrated in Sattler's monograph, p. 848. The remarkable feature noticed in our case, that the vessel, after it was cut, did not bleed, has its analogy in the fact, that the bleeding in vascular tumors is considerable only when we cut into their mass, but not when we cut the afferent vessels at their borders. The vessel in our case evidently was small during its passage

through the superior orbital fissure, and its contraction after it was cut, may have been facilitated by the prolonged compression during the operation, and by retraction into the narrow bony fissure after the large elastic tumor, which drew it into the orbit, had been removed. In Nélaton's case, the superior ophthalmic vein was very small, almost of natural size near and in the superior orbital fissure, but in the orbit it was enormously dilated. That the blood-current in this vessel was reversed, centrifugal instead of centripetal, as it always is in these cases of arterio-venous communication, was, in our case, further evidenced by the fact that the hemorrhage from cutting into the periphery of the orbital tumor was arrested by compression of this vessel at the apex of the orbital pyramid.

6. In explanation of the cure of the arterio-venous communication in the cavernous sinus by the extirpation of the contents of the orbit, I assume that the sudden stoppage of the external outlet of the blood must have been followed by thrombosis in the parts of the cavernous sinus adjacent to the entrance of the ophthalmic vein, and the thrombus must have plugged the perforation of the internal carotid still present at that time.

ON CORNEAL GANGRENE PRODUCED BY INANITION.

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Translated by Dr. PORTER FARLEY, of Rochester, N. Y.

DURING the last two years, I have had the opportunity of observing several cases of corneal gangrene, caused by inanition, not preceded or accompanied by inflammatory symptoms. They were observed in the out-door department of the Elizabeth Children's Hospital, and in the Ophthalmological Department of the Semenow Military Hospital. In the Graefe-Saemisch hand-book there is only a brief history of the few such cases hitherto known.¹ I therefore think it will be useful for me to publish, somewhat in detail, the history of the cases which I have observed.

Most of the cases occurred in sucklings. The corneal disease was generally bilateral, and was preceded by a more or less pronounced xerosis conjunctivæ oculi; but the eye-balls were otherwise healthy, with no symptoms of irritation. The most frequent cause for this bilateral corneal gangrene appeared to be malnutrition of the child, coinciding in time with anæmia or fasting in its nursing mother. In some of the cases, however, the cause appeared to be a disease in the child only,—such as entero-catarrh or pneumonia, and in these, probably on account of their early fatal ending, there occurred only a partial unilateral corneal destruction. On the other hand, a long-continued fast on

¹ "Handbuch der gesammten Augenheilk.," Bd. xvii, 1, p. 225.

the part of a previously well-nourished mother, inducing great emaciation in the child, but no actual disease, was sufficient to cause rapid destruction of the cornea. These seasons of fasting seemed to be the special occasions for the occurrence of corneal gangrene in children already sick, even when the mothers claimed to have a sufficiency of milk. The number of cases increased toward the end of these fasts, while at other times there occurred only occasional cases of unilateral corneal gangrene in the out-door department of a clinic much frequented by atrophic children of the poorest classes.

In a part of the cases, after the occurrence of a slight xerosis of the conjunctiva oculi, or even without this prodromal symptom, suddenly the entire surface of both corneæ became dull and clouded, and broke down into a soft yellow mass, the condition extending, in a few days, to the depth of the membrane of Descemet. In another class of cases there existed, for some time, a decided xerosis of the conjunctiva oculi, or of the cornea, while the clouding, softening, and disintegration began at the corneal margin, and only at certain places penetrated quickly the corneal substance, while they spread slowly over the entire corneal surface. The more or less rapid destruction of the cornea evidently depended directly upon the poor nutrition of the child alone, or of both the mother and child. In those cases where insufficient nutriment and disease were the co-existing causes of the corneal destruction, the process was very rapid and the result the most deplorable.

Under the conditions last described, the necrosis began by a uniform superficial clouding of the surfaces of the corneæ, either both simultaneously, or one shortly after the other, like the clouding seen in a slight superficial keratitis, or in the dead body. Simultaneously with this superficial clouding, or, at latest, upon the next day, grayish-white spots appeared at the centre or near the margin of the cornea, which soon assumed a yellow color and began to break down into minute shreds of mortified tissue. From these points the destruction spread rapidly over the entire cornea. In other cases, a milk-white stripe appeared, running across

a cornea which, the day before, had been entirely clear. The next day, the tissue covered by this stripe turned yellow and began to break down, while the clouding of the other parts now first began to appear. In all the cases the corneal tissue was nearly completely destroyed within three or four days, and by the end of the week the membrane of Descemet was completely denuded. For instance: one of these poorly-nourished sucklings was brought to the clinic on account of a slight redness of the edges of its lids, and of a forcible closing of the eye caused by xerosis. The corneæ were clear. On the next day there appeared on one cornea a broad white stripe, corresponding to the palpebral fissure, and a second stripe at the lower margin of the cornea. On the following day these parts of the cornea began to break down, and the remaining parts had begun to assume a white color, with here and there deep penetrating gray spots. By the sixth day the disintegrated tissue of both corneæ was almost entirely thrown off, so that here and there the transparent membrane of Descemet was laid bare. Another child was brought in, from whose corneæ the mortified tissue was already partially exfoliated. Its mother had noticed a clouding of the corneæ for the first time only two days before. When the exfoliation of the necrotic tissue began, there appeared a puffy swelling of the conjunctiva, and increased secretion.

The result of these rapidly progressing cases, when the children survived, was either phthisis or staphyloma of the corneæ. I happened subsequently to see two of these patients. In one of them, in the course of three or four weeks, phthisis of the corneæ had been the sequel of bilateral rupture of the membrane of Descemet; in the other, after two months there was phthisis of the cornea on the left side where rupture had occurred, and on the right side was a hemispherical staphyloma with a dry cicatricial surface. The staphyloma could still be covered by the lids and its lower, outer quadrant was still somewhat transparent. The mother stated that the child could see with this eye and that it grasped at objects held before it.

In cases where the mother in spite of her fasting was well

nourished and rosy, and the sucklings had suffered in their nutrition only by their own disease, and in those cases where the children being larger had been weaned and had become marasmic through long sickness and unfavorable environment, the gangrene of the cornea, although it might be bilateral, was slower in its course, and was generally preceded by a xerosis of the conjunctiva oculi and of the cornea. There appeared upon the conjunctiva oculi, near the outer canthus, a dry triangle covered with a fine white foam. When this foam was wiped away the subjacent conjunctiva presented a fatty, shimmering, crumpled appearance, and the tears did not spread out uniformly upon it.

This dry foam-covered spot upon the conjunctiva was the first noticed indication of the insufficient nutrition of the otherwise well-developed child. Later, this dryness spread over the cornea and over the other parts of the conjunctiva not covered by the lids. It disappeared with the occurrence of a catarrhal swelling of the conjunctiva; or where this catarrh already existed the dryness appeared only on the surface of the cornea. This dryness of the conjunctiva and cornea caused the child to keep the eyes forcibly closed, and this was generally the reason why the mother brought it to the clinic. Simultaneously with the xerosis or very soon after it a superficial clouding appeared about the margin of the cornea, which assumed a whitish appearance like ground glass. At first the iris could still be well seen. As this whitish appearance invaded the central portion of the cornea the marginal portion assumed the appearance of a dirty yellow ring, and at places its disintegrating tissue was thrown off in minute shreds, so as even to lay bare the membrane of Descemet. A careless opening of the eye easily caused a rupture of this membrane. If the patients at this stage submitted to treatment and came into more favorable environment, the cloudiness of the cornea began to clear up, and healing of the part where ulceration had occurred went on rapidly. The same was observed in those cases which were treated as out-door patients, provided the mother was properly fed and the child was regularly brought for treatment. In these cases a small peripheral spot or a

prolapse of the iris which did not interfere with vision was the only trace finally left of the corneal disease. If, on the contrary, the children continued to have poor care and were not brought regularly to the hospital, the destructive process extended rapidly over the whole cornea. The membrane of Descemet was soon entirely denuded and bulged forward, as in the cases first described. The result was phthisis or total staphyloma of the cornea. In these cases, as in the very rapid ones, a catarrhal swelling of the conjunctiva accompanied the exfoliation of the necrosed tissue, and during this process the xerosis disappeared. The disease at this stage resembled a blennorrhœa with secondary corneal gangrene, and before my attention had been directed to the manner of their beginning, I had mistakenly recorded two of the cases as such in the hospital case-book.

It is apparent that most of such children will succumb to the disease, and to marasmus before cicatrization of the cornea takes place. If, however, a child blinded by corneal gangrene should subsequently come under observation, one would be very likely to attribute the bilateral phthisis of the cornea to blennorrhœa.

Unfortunately, in most of my cases, both corneæ were already lost when the child was first brought in. The case of a beggar's child, which had begun gradually and had advanced without any care to entire loss of both corneæ, showed such temporary improvement under treatment as an out-door patient, that it may be fairly assumed that if this child, or even the rapid cases, could have been promptly received into the hospital, the entire destruction of the cornea might have been prevented. I have, therefore, established the rule to receive immediately into the hospital all children who have incipient xerosis of the conjunctiva oculi or of the cornea, whether due to anæmia of the mother or disease of the child. Such cases are certain to appear at the children's hospital, particularly after the seasons of long religious fasts.

The cases of sucklings with corneal gangrene which I here publish, appeared, with two exceptions, after the long fast at the end of March and the beginning of April, or

after the two weeks' fast in August. The two exceptions were cases of bilateral corneal gangrene, due to marasmus following pneumonia and catarrhal enteritis. But even in these the nursing mother was very anæmic.

It is not to be supposed that the keeping of even a long fast by the mother can cause a corneal gangrene in her suckling infant, provided she herself remains healthy and has the necessary variety of fast-food from which to choose. I do not know whether a similar disease of the cornea occurs among infants in the more affluent classes. During my practice for three years in the Ural, where the people observe the fasts very strictly, but are in good circumstances, and in particular have a good fish diet, I never saw such a case among the thousands of diseases which there came under my notice. When, however, the poorly-fed, anæmic woman of the lower class is compelled for a long time to subsist upon the meagre fast-diet, or when the hydræmic, nursing, pauper mother is compelled to fast against her will, it is no wonder if this has an effect upon her suckling child and its cornea, because disease in the mother enters as a factor in the case.

At all events, my fear of finding incipient corneal gangrene was subsequently confirmed when a nursing mother, who had become anæmic from fasting or from some other cause, brought her child to the clinic on account of disease in its eyes.

I often saw both slight and severe cases of xerosis of the conjunctiva oculi, some of them annular in form and surrounding the cornea, in patients from three to seven years of age, and even older, who were brought to the out-door department of the children's hospital, on account of infiltration of the cornea. At the end of the long fasts children at other times well-fed and rosy-cheeked, but who had lately had only the fast-diet, were brought to the clinic on account of a dryness of the conjunctiva, which caused them constantly to keep their eyes forcibly closed. The xerosis in these children was directly dependent upon their lowered nutrition or the use of the fast-diet, and in the absence of any general disease had no evil effect upon the cornea. It dis-

appeared upon the use of proper food or with the end of the fast. Xerosis of the conjunctiva is also often seen here in adults (soldiers and workmen), who come to the clinic to be treated for hemeralopia, due to the same cause. In such cases the xerosis is only an indication that they have fasted, and has no bad consequences so long as the person himself and his cornea remains well in other respects. As, however, a corneal infiltration in poorly-fed sick children is often the starting-point of a rapid destruction of the cornea, even so I have satisfied myself that marginal phlyctenulæ and corneal infiltrations break down very rapidly in adults who have become so reduced by sickness or insufficient nourishment, that a decided xerosis of the conjunctiva occurs. I recall one case in particular, that of a soldier, who was received into the hospital on account of a marginal phlyctenule of the size of a pin head, but without any general disease. Simply in consequence of poor nourishment he acquired a severe xerosis of the conjunctiva oculi of both eyes. After two days the phlyctenules could be picked away with the forceps in the form of gangrenous plugs, revealing such a loss of substance as to threaten momentary rupture. In the case of another patient, who was much reduced by profuse diarrhœa, a corneal infiltration caused by an inverted cilium after the occurrence of a xerosis of the cornea, broke down in a few days, leaving a very considerable loss of substance.

Incipient gangrene of the cornea was several times observed in the military hospital as a consequence of severe constitutional diseases, such as typhoid fever, scurvy, and profuse diarrhœa, following ulceration of the intestines. It appeared either upon one or simultaneously upon both corneæ, preceded by a dryness and superficial clouding, or the patients first presented themselves at a time when exfoliation of the mortified tissue had already begun, and without any noticeable xerosis of the conjunctiva or cornea. Without any accompanying symptoms of irritation there appear in these cases, either at the centre or upon the margin of the uniformly clouded cornea, one or several gray-white points of softened corneal tissue, which quickly enlarge and deepen,

soon causing a rupture of the membrane of Descemet. In one case the inner half of the right and the outer half of the left cornea were both covered with such gray points, which were already confluent upon the corneal margin, and formed a crescentic area of softened tissue occupying half the peripheral zone of the corneæ. The xerosis of the corneæ caused the patients to keep the lids constantly closed, and they complained of an uncomfortable feeling of dryness. The chronic catarrhal swelling of the conjunctiva, which happened to be present, assumed a lax, livid appearance. I never, however, saw such rapid gangrene of the entire cornea in large children and adults as in sucklings. These older patients were already in the hospital or came early to it.

As soon as the proper treatment and the consequent improvement of the general health caused an arrest of the gangrene and induced a reactive keratitis, this in turn caused in adults an iritis, with severe ciliary neurosis, pericorneal injection, the formation of posterior synechiæ, and hypopyon. Even in those cases, where, during the process of healing, the eye appeared to remain quiet without pericorneal injection and ciliary neurosis, synechiæ were subsequently observed upon the pupillary margin opposite the cicatrized ulcers.

The result in those cases which were already in hospital, and which were properly treated, was quite satisfactory. With the disappearance of the xerosis, ulceration ceased, and the cornea began to clear up. A peripheral defect, even with rupture of the cornea, healed without prolapsus iridis, leaving only an insignificant leucoma. In a case of central rupture with adherent corneal scar, and distortion of the pupil, there nevertheless remained so much transparent cornea that vision was subsequently much improved by iridectomy.

By the death of a soldier, sick with ulceration of the intestines, I obtained for microscopic examination an eyeball, in which there was still xerosis, but in which healing of the ulceration had begun. The epithelium of the cornea was reduced to a simple layer of round and cylindrical epidermal-like cells, resting upon Bowman's membrane. The epithe-

lial cells appeared upon section to have shrunk down to thin scales, with a thread-like nucleus. At the corneal margin they were shrunk down to a single layer of round cells. Upon the irritated places of the cornea and upon the margin of the healing ulcers, the shrunk cells of the middle and deep layers appeared to be again swollen up and multiplied by cell division.

Speaking of corneal gangrene, Förster¹ says: "We may regard this destruction of the cornea as a kind of necrosis due to insufficient nutrition, like the bed-sores which appear in typhoid fever and in other severe constitutional diseases, or like the corneal gangrene in diabetes." In the cases here described, the insufficient nutrition was evidently the cause of the destruction of the cornea. The pressure of the lids, which, owing to their forcible closure must often have been considerable, appeared to exercise no influence in causing the gangrene, as the destruction seemed to begin at no determined place upon the cornea. It started sometimes at the margin and sometimes at the centre. Moreover the persistent blepharospasm did not cause gangrene of the cornea in generally well nourished children, who in consequence of fasting were suffering from extensive xerosis of the conjunctiva. Neither did the dryness and splitting of the epithelium cause by themselves a progressing disease in the corneal tissue, such as Horner² describes, since clouding and ulceration of the cornea often appeared together without preceding xerosis. The inciting cause for the ulceration of the cornea, appeared to be simply the insufficient supply of nutriment in consequence of an underlying general disease. This was indicated, too, by the dryness of the corneal epithelium and of the conjunctiva surrounding the cornea, as also by the livid color and laxness of the swollen, catarrhal conjunctiva. We see in blennorrhœa of the conjunctiva how soon an excessive swelling of the conjunctiva with consequent obstruction to the circulation, can cause gangrene of the cornea. It seems to me that the occurrence of gangrene in the non-vascular cornea of feeble patients, may well be

¹ *L. c.* Bd. vii, 1, p. 227.

² Gerhardt, *Handb. d. Kindererkrankungen* Bd. v, 2, p. 330.

compared to that gangrene of the extremities which follows severe constitutional disease,—for instance typhoid fever. During the late Turko-Russian war, I several times saw cases where there was great weakness of the heart's action, and sluggishness of the circulation, in which improper care, a slight hanging downward of the limb, a cold barrack, etc., sufficed to cause, in a single night, stasis in the extremity, and gangrene of an entire forearm or leg.

Pflüger¹ in his experiments with Fluoresceine, has shown that the course of the nutrient stream in the cornea is from the periphery toward the centre, that the nutrient supply for the superficial layers comes from the conjunctiva, while that for the deep layers is from the sclera, and that in respect to the nutrition of the cornea, the aqueous humor has little influence. Perhaps with the occurrence of corneal gangrene there may be the formation of thrombi in the pericorneal vessels. The truth of this theory has not been proved, but it well explains the sudden clouding and ulceration of a previously clear and healthy cornea, with slight or no noticeable xerosis of the conjunctiva, as well as that ulceration which after a long preceding xerosis of the conjunctiva begins at the margin of the cornea, and proceeds gradually toward the centre. I remember the case of a boy from the Dorpat clinic who had been operated on by Prof. v. Oettinger, for the removal of a dermoid cyst from the temporal side of the right eyeball, within the recti muscles. The operation necessitated a very considerable exposure of the eyeball by removal of the conjunctiva, and of the capsule of Tenon with the wounding of vessels and nerves. After three or four days, the eyeball having meanwhile been kept entirely quiet, there appeared at the upper margin of the cornea a brownish-yellow line, which grew gradually wider. Soon the entire cornea became necrosed. This necrosis may have been due to the wounding of the nerves, but a more probable cause seems to have been the deprivation of nutriment caused by the extensive denudation of the eyeball.

In the treatment of this corneal gangrene, very good re-

¹ *Klin. Monatsschr. f. Augenheilk.* 1882, März.

sults were obtained by the use of eserine, in the form of salve, composed of eserine and vaseline in the proportions of 0.05 : 8.0. The vaseline soothed the unpleasant feeling of dryness, and caused a temporary disappearance of the xerosis. The eserine salve was used only once a day for the out-door patients, but for those in the hospital it was applied two or three times daily, and was supplemented with chlorine water, and the application of a bandage saturated with a four-per-cent. solution of boracic acid. Very soon after the eserine had time to take effect, the ulceration ceased and the cornea began to clear up. The diminished pressure within the anterior chamber, as manifested by that best of all manometers, the evident sinking of a keratocele after the use of eserine, and the greater freedom thereby allowed to the circulation, may, perhaps, be the cause for the improvement. At all events, in the corneal gangrene caused by blennorrhœa neonatorum, the use of eserine is followed very promptly by a decided vascularization of the corneal margin, an arrest of the gangrene, and a rapid healing of the ulcer. It was evident, also, that the cleaning of the cornea and the arrest of the gangrene was not simply due to the more favorable hygienic surroundings of the in-door patients, but to the use of eserine; for in spite of the persistence of the general disease in the in-door patients, and in spite of the continued unfavorable surroundings of the out-door patients, the corneal ulceration ceased, and the xerosis disappeared upon the use of eserine. The ulceration of the cornea healed under this treatment, even when the general condition in adults remained unimproved and had, later, a fatal termination. In a soldier much reduced by typhoid fever, pleurisy, and scurvy, the cloudiness and dryness of the cornea was at first diagnosed as superficial keratitis, and atropine was used in the eye for some days without lessening the clouding of the cornea; on the contrary, ulceration proceeded, and rupture took place at its centre. The condition of the cornea improved immediately upon the use of eserine. Its effect was very remarkable in the case above mentioned, that of the suckling child of the beggar woman living under the most unfavorable

conditions, and treated as an out-door patient. After eserine had been applied for two successive days, the cornea, which before had been diffusely clouded and dry, was found to be absolutely clear, but the next day being Sunday, the child had no treatment until Monday, when an excessive clouding had reappeared.

A small hypopyon, occurring in an adult after ulceration of the cornea in consequence of a complicating kerato-iritis, disappeared in two days upon the use of eserine, but reappeared immediately when atropine was used in order to break up a synechia which was forming. Immediately after the arrest of the gangrene, however, atropine must be instilled in order to prevent adhesions of the iris. It can be safely used at this stage, for the danger from ulceration is passed.

In the children's hospital both eserine and atropine are used only in the form of vaseline salve, and with very good results. The use of the vaseline salve has a great advantage over that of the aqueous solutions of these alkaloids in this respect; that the latter are immediately washed out by the tears of the crying child so that scarcely any effect is obtained by a single instillation, while the vaseline salve adheres to the conjunctiva and is not so easily washed away. This is the more important for the reason that, to avoid the danger of poisoning, these alkaloids are not given out to be used at home, but are applied daily at the out-door clinic by the physician himself. Much more is accomplished in this way by a single application than when the remedy is given to the mother with instructions to use it once a day. It is difficult for her to control the crying child, and she generally appears next day at the clinic with the child and the medicine.

Upon reviewing the subject, we must conclude that long and wasting diseases with insufficient nutriment, particularly the milk of an anæmic mother, may be the factors initiating corneal gangrene which is generally bi-lateral and preceded by xerosis of the conjunctiva oculi and of the cornea; that the disease is more rapid and severe in sucklings than in larger children and adults; that the keeping of a long-con-

tinued fast by a poorly nourished anæmic mother is by itself sufficient to produce bi-lateral corneal necrosis in a healthy suckling, and still more likely to cause it in a sickly one; that eserine gives satisfactory results in the treatment of corneal gangrene.

CASE 1.—N. A., four months old, was brought to the hospital April 13, 1881, on account of disease of the eyes, had a slight broncho-entero-catarrh and was much emaciated. The mother was anæmic and was fasting, but claimed to have sufficient milk and to be perfectly well. She had three other healthy children. The child kept its eyes fast closed. Upon opening the lids a dry triangular space covered with foam was seen upon the conjunctiva oculi at the outer canthus. After wiping away this white foam the conjunctiva had a fatty, finely corrugated appearance. The tears did not spread uniformly over it (xerosis).

The conjunctiva palpebr. and the margins of the lids are slightly congested. Both corneæ are clear. A weak solution of lead was given to be used as eye drops. On the next day without any inflammatory symptoms, a white stripe had extended horizontally across the cornea of the left eye, while the other parts of the cornea showed a slight superficial clouding and appeared somewhat dry. The right cornea was still clear. This, however, became clouded on the third day; meanwhile the left cornea had begun to ulcerate. On the sixth day both corneæ were nearly destroyed; the conjunctiva was soft and swollen, and was secreting copiously. The case looked upon casual inspection like one of blennorrhœa which had led to corneal gangrene. It was a month and a half before I again saw the mother and child. At that time there was phthisis of the left cornea and staphyloma of the right. The mother stated that the child could see and grasped for objects held before it. Its general condition was much improved but it was still quite emaciated.

CASE 2.—J. F., seventeen weeks old, much emaciated and sick with diarrhœa, brought to the clinic March 21st. On right eye is xerosis of the conjunctiva; the cornea uniformly cloudy, but the iris can still be discerned. The disease is further advanced in the left cornea which is ulcerated at several places. The left conjunctiva is livid, lax, and swollen, and secreting to some extent; no xerosis of the conjunctiva oculi. The mother is anæmic and complains that she has but little milk in her breast. Being asked

if she was fasting, she said she was doing so against her will, as her husband was a drunkard and she herself a beggar. The child was treated with eserine-vaseline salve as an out-door patient. After two days the right cornea had become clear and the gangrene of the left cornea was arrested. The next day was Sunday, on which there is no reception of patients in the out-door department, and consequently the application of eserine was omitted. On Monday the right cornea was again clouded, and much more so than at any time before. The gangrene of the left cornea had recommenced. On opening that eye there occurred a rupture at the corneal margin and a prolapse of the iris. The child was brought to the clinic on the two or three following days, but it grew gradually weaker, and the corneal necrosis slowly progressed. Meanwhile the mother had become disabled from a dropsical swelling of the leg, so that she was obliged to go into a hospital, and the child appeared no more at the clinic.

CASE 3.—J. A., two months old, emaciated, suffering from slight bronchial catarrh, but has no diarrhoea, was brought to the out-door clinic Aug. 17th. The mother was nursing the child, was anæmic, and had been keeping a two weeks' fast, but claimed to have plenty of milk, and to be perfectly healthy. Both corneæ of the child were necrotic, and the tissue at several places was exfoliated. Rupture of the cornea occurred upon opening the left eye. The conjunctiva was swollen at the margins of the lids, and was yielding some secretion; the margins of the lids were somewhat reddened; no injection of the conjunctiva oculi. The corneæ became clouded for the first time two days before. Eserine salve was applied once a day, to prevent the development of staphyloma. A fortnight later there was phthisis of both corneæ, but the general condition of the child was meanwhile considerably improved.

CASE 4.—J. M., five months old, brought to the clinic Sept. 14th, on account of disease of the eyes; has entero-catarrh, but is not greatly emaciated. The diarrhoea has lasted for a month, but the eyes became diseased only three days previously. The mother, forty-two years old, nurses the child, and has milk enough, but is very anæmic. The margins of the child's eyelids are eczematous; the conjunctiva swollen and livid with a purulent secretion. The case resembled one of chronic blennorrhœa. The left cornea was of a grayish-white throughout its whole extent, and was beginning to break down in the centre. The right cornea was tran-

sparent. Neither eyeball showed symptoms of irritation. General treatment was begun, and eserine salve was applied twice daily. On Sept. 15th, the lower half of the right cornea showed a slight superficial clouding and dulness.

Sept. 17th.—The entire left cornea necrotic ; rupture in the centre. The chemosis decreased. On the right cornea the clouding had not spread, but had sunken deeper in, and one quarter had become necrosed. Diarrhœa decreased. The child cries louder.

Sept. 20th.—Upon opening the left eye the lens fell out of it. The entire right cornea was clouded and softened ; more than three fourths of its surface was exfoliating necrosed tissue.

Sept. 21st.—The entire right membrane of Descemet was denuded. The child's health was somewhat improved, and the diarrhœa decreased ; it was not brought to the clinic again.

CASE 5.—A. K., seven months old ; brought to the clinic July 7th, much emaciated ; listless, and anæmic, has scurvy, enterocatarrh, and bilateral catarrhal pneumonia. The mother has milk enough, but appears very anæmic. The child was taken with measles, severe diarrhœa, and coughing, one week ago, since which time both corneæ have become clouded. Their surfaces are dry and dull, resembling a superficial keratitis, showing here and there white specks. The conjunctiva was not dry, was slightly reddened, and was yielding a secretion. Atropine was dropped in both eyes, and the pupils were dilated. On the next day as much as a third of the left cornea had become necrosed and exfoliated. The same process had taken place, though to a somewhat less extent in the right eye. The child was not brought again to the clinic.

CASE 6.—A. O., four months old, greatly emaciated, brought to the clinic April 16th, on account of her eyes. The mother, anæmic and poorly nourished, nurses the child herself ; said that the child's eyes became diseased four weeks ago ; that they did not suppurate at first, but only of late. Margins of lids red ; conjunctiva hyperæmic and yielding a catarrhal secretion. On the right side is incipient phthisis corneæ, with prolapsus iridis. On the left side the corneal tissue is entirely exfoliated, leaving the bulging membrane of Descemet denuded. The pupil is contracted. The membrane of Descemet ruptured while the lids were being held open. There is no decided pericorneal injection. The mother had not noticed when the corneæ first became clouded. The child was not brought again.

CASE 7.—W. F., two months old, brought to clinic near the end of March, sick with diarrhœa and greatly emaciated. Both corneæ are greatly clouded, but without any accompanying inflammatory symptoms. On both sides there had been an ulceration of pin-head size, and prolapse of the iris. The conjunctiva swollen and secreting. No xerosis of conjunctiva. The mother is fasting, but well nourished and rosy. After a few days' use of the eserine salve, the progress of the corneal gangrene was arrested, the corneæ cleared up, and a fortnight later the ulcers healed. A small prolapsus iridis at the corneal margin in both eyes remained as the evidence of the necrosis.

CASE 8.—M. W., three years old, brought to clinic April 14th, much emaciated, sick with catarrhal pneumonia of the right lung, and severe diarrhœa. The conjunctiva oculi and surfaces of corneæ in both eyes are quite dry. The corneæ white. This whiteness of the general surface of the corneæ was assuming a yellowish tinge at the margin; at the lower part of the left cornea the tissue in a space the size of a pin-head had softened and been exfoliated. The dryness of the conjunctiva caused blepharospasm and a slight entropion of the under lids. No inflammatory symptoms to be observed in either eye. The child was not brought regularly to the clinic, its general condition became worse, necrosis of the right cornea began, and so, on the 21st of April, it was received into the hospital. Besides general treatment, eserine salve was applied twice a day to the eyes, chlorine water was instilled once a day, and a bandage saturated in a four-per-cent. solution of boracic acid was applied. Although the general condition improved only slightly during the ensuing days, both corneæ cleared up by the 25th of April, and the xerosis improved markedly. April 28th, the xerosis has disappeared; the child opens its eyes; the corneal ulcers are healed. During all this time the evening temperature of the child has been above normal, and during the last fortnight the morning temperature also. The general health grew worse, and the child died of pneumonia on May 28th. During the last days of its life, no further pathological changes occurred in its eyes.

CASE 9.—A. R., two and one half years old, brought to the clinic March 26th, with the statement that it had not opened its eyes for two weeks. The child is healthy and rosy, but throughout the whole fast season it has had only fast-food. There is xerosis of the conjunctiva. The limbus corneæ is dry and slightly clouded.

The corneæ are clear. There is slight hyperæmia of the conjunctiva, and redness of the margins of the lids. Milk diet was ordered, and eserine salve applied once a day to the eyes. In a week the xerosis had diminished decidedly, and the child opened its eyes. It was brought no more to the clinic.

TRANSLATOR'S NOTE.—The author gives the history of four other cases, which, in their general history, resemble those above related. They all show marked improvement under the use of *eserine*. *Atropine*, on the contrary, appeared to be useless.

A CASE OF GUMMA OF THE OCULAR CONJUNCTIVA.

By DR. JAMES L. MINOR,

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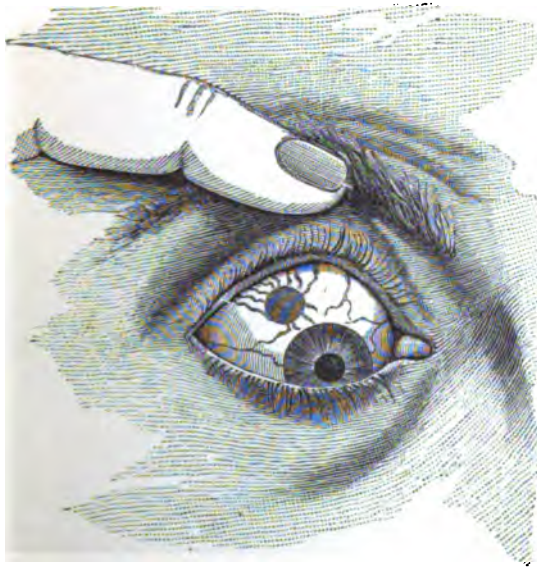
DURING the past summer I had under my care a gentleman who presented the very rare condition described in the heading of this article.

Wm. T., æt. thirty-eight. August 3, 1882. A large, healthy-looking man, who has lost three sisters, and other members of his family, and several relatives, from phthisis. Takes cold easily, and usually suffers from one during every winter, with a troublesome cough. Had pneumonitis in '78, and since then has had three hemorrhages from the lungs. Has had gonorrhœa twice. The first attack in '65 ; the second he has just recovered from. Contracted syphilis in '65, and, following the initial lesion, appeared cutaneous eruptions, adenitis, ulcerative sore throat, alopecia, and rheumatism. The occurrence of these phenomena covered a period of about two years, during which time constitutional treatment was instituted, and continued at irregular intervals. No further symptoms of syphilis made their appearance until he consulted me. Three weeks ago the right eye became, as the patient describes it, "blood-shot, with a sense of dryness and constriction, but no pain." Thinking this an ordinary cold, no attention was paid to it until to-day, when it was accidentally discovered, on raising the upper lid, that a small tumor occupied the supro-external quadrant of the globe, above the corneal margin.

I found the eye but slightly injected, and, to a casual examination, about normal ; but when the upper lid was raised, a small cir-

A Case of Gumma of the Ocular Conjunctiva. 229

cular elevation or tumor was seen in the conjunctiva, covering the supero-temporal quadrant of the globe. The tumor was four *mm.* from the corneal margin; measured nine *mm.* in diameter, and about two *mm.* in height. Its margin was sharply defined, and the surrounding conjunctiva was œdematous. Six or eight blood-vessels, coming from the *cul-de-sac*, converged toward the tumor and seemed to enter its structure, where most of them were lost; several, however, passed beyond, as far as the margin of the cornea. The tumor occupied the conjunctiva and sub-conjunctival tissue only, as it could be moved over the sclera. The color of the tumor was a dark red. At its border it assumed a yellowish hue.



The vision in this eye was $\frac{4}{8}$; and nothing abnormal could be discovered in the fundus. He was given a wash of boracic acid for the eye; and a prescription that gave him $\frac{1}{8}$ of a grain of bichloride of mercury with five grs. of potas. iod. three times a day. He was also placed on gradually increasing doses of iod. potas.

August 9th.—Some pain in eye last night, and find injection of globe more diffuse and general. The tumor has not changed in appearance; it is, however, more adherent to the sclera than it has been heretofore. V = $\frac{4}{8}$. Dr. Noyes, who saw the case to-day,

discovered a few fine, floating bodies in the anterior part of the vitreous.

August 11th.—Much better. Injection only around tumor. Tumor noticeably reduced in size. On August 23d nothing could be discovered about the eye to denote former trouble, but slight pigmentation at the previous seat of the tumor. He was dismissed as cured, on September 13th.

The patient was seen about the middle of November. There had been no further return of the eye-trouble, but he then had a gumma of the tongue about 2 *cm.* in diameter, which had broken down in the centre, leaving an ulcerating cavity that rapidly healed when the patient was placed upon the vigorous use of the mixed treatment.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY DURING THE FOURTH
QUARTER OF THE YEAR 1882.

By H. MAGNUS, Breslau ; C. HORSTMANN, Berlin ; and
A. NIEDEN, Bochum.

WITH THE COÖPERATION OF

C. E. FITZGERALD and FERGUSON, Dublin ; E. MARCKWORT and P. VON
MITTELSTÄDT, Antwerp ; DANTONE, Rome ; HIRSCHMANN, Charkow ;
S. M. BURNETT, Washington ; SCHIÖTZ and OLE BULL, Christiania, etc.

Translated by DR. F. E. D'OENCH, New York.

A.—GENERAL OPHTHALMOLOGICAL LITERATURE ;
GENERAL PATHOLOGY, DIAGNOSIS, AND THERA-
PEUTICS ; NORMAL ANATOMY AND PHYSIOLOGY.

By H. MAGNUS, M.D.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIO-
GRAPHICAL, AND HISTORICAL SUBJECTS.

1. BAUDRY. Simulation de l'amaurose et de l'amblyopie, des principaux moyens de la dévoiler. Paris, 1882. BERTHIER.
2. BAUDRY. De l'amblyopie unilatérale simulée. *Arch. d'ophth.*, vol. ii, No. 6.
3. GUTTSTADT. The invalids in the population of Prussia, Dec. 1, 1880. *Report of the Royal Prussian Statistical Bureau*, 1882.
4. LANGNIER. Maladies simulées de l'appareil visuel. *Nouv. dict. de méd. et de chir. pratiq.*, vol. xxxiii, p. 211.

5. MAGNUS. The blind in the Breslau institution for the instruction of the blind. *Bresl. aerztl. Zeitschr.*, 1882, No. 19.

6. MARTIN. Considérations sur la cause la plus fréquente de cécité chez les agriculteurs. *Rev. d'ophth. du sud-ouest*, vol. iii, p. 204.

7. Ophthalmia in the expeditionary force of Egypt. *Med. Times*, Oct. 14, 1882, p. 447.

8. REICH. Report on ophthalmology in the military districts of the Caucasus for 1881 and 1882. *Militär-Med. Four.*, Nov. and Dec., 1882.

9. v. ROTHMUND. On instruction in ophthalmology. *Mittheil. aus der Königl. Univ. Augenklinik zu München*, vol. i. Munich and Leipsic, 1882, vol. vi, p. 270.

10. v. ROTHMUND and EVERSBUCH. Equipment of the clinic, hygienic conditions, clinical statistics, cases, etc. *The same*, p. 282.

11. SCHÜRMANN. The hygiene of the eyes. Published after the author's death by Dr. Eversbusch. *Mittheil. aus der Königl. Univ. Augenklinik zu München*, vol. i.

12. STEFFAN. What can we do, the individual as well as the community and the State, to check the evil of blindness? *Report of the fourth congress of teachers of the blind*, at Frankfort-on-the-Main, 1882.

BAUDRY (1 and 2) recommends the methods of Herter, Javal, and Monoyer for the detection of simulated amblyopia. If a spectacle frame with rotating prisms be brought before the eyes, Monoyer's method may be varied by rotating the prisms and using his letters in the stereoscope.

V. MITTELSTÄDT.

3. On Dec. 1, 1880, there were 22,677 blind persons in Prussia: the ratio was 8.3 to 10,000 inhabitants; of men, 8.4 to 10,000; of women, 8.2 to 10,000. In the various provinces the ratio varied between 6.6 (Berlin) and 10.5 (East Prussia). The number of blind persons has diminished 1.3% since 1871.

According to MAGNUS (5) the principal causes of blindness of the inmates of the Breslau institution were the following: blenorrhœa neonatorum, 34%; exanthemas, 18%; congenital amaurosis, 10%; cerebral atrophy of the optic nerve, 10%; sympathetic ophthalmia, 9%. The total number examined of persons blind in both eyes was 87—52 males, 35 females.

MARTIN (6) found that hypopyon keratitis is the cause of 67% of all cases of blindness among the rustic population, in the city of only 8-10%.

During the last campaign in Egypt (7) 60 men per day became affected with ophthalmia. Oculists should accompany an army during a campaign.

FERGUSON.

ROTHMUND (9 and 10) reports as follows on the Munich ophthalmic clinic: Chloroform is used only for enucleations and exenterations of the orbit, and prolonged operations on the lids. The after-treatment of squint-operations consists in cold applications. After an iridectomy, the bandage is removed on the third; after extraction, on the third or fifth days respectively, but the patients are not allowed to get up until the fifth and seventh days, respectively. The rooms are darkened, and the patients wear a pair of blue goggles as long as they are in the hospital. Disinfected solutions of atropine, zinc, and eserine are used. Astringent applications are not employed. Pilocarpine is used to advantage in subretinal effusions. Luetic affections are treated with a combination of inunction and Bärensprung's method. In the last two years 6,499 patients were treated.

b.—STATISTICAL PAPERS.

1. S. M. BURNETT. Second biennial report from June 1, 1880 to March 31, 1882. 14 extractions, 2 losses.

2. DAVIDSON and LAWFORD. Statistical report of eye department. *St. Thomas Hosp. Rep.*, vol. xi, 1882.

3. DONDERS. Drie-en-twintigste jaarlijksch verslag betreffende de verpleging en het onderwijs en het nederlandsch gasthuis voor ooglijders.

4. HAAS. Statistics of 300 iridectomies performed in the ophthalmic clinic from 1870 to 1880. *Mittheil. aus der Königl. Univ. Augenkl. zu München*, vol. i.

5. JUST. Tenth report of the Zittau Ophthalmic Institute for 1880 and 1881. Zittau, 1882, 111 extractions according to Graefe, 15 according to Pagenstecher, 5,992 patients.

6. LUNDY. First biennial report of the Michigan Ophthalmic and Aural Hospital, Oct. 1, 1880 to Sept. 31, 1882. 2,083 eye patients; 300 operations: 7 extractions; 19 enucleations; 1 neurotomy; 12 iridectomies.

7. STEFFAN. Twentieth annual report of Dr. Steffan's Ophthalmic Institute, in Frankfort-on-the-Main, 1882.

8. STÖR. Summary of the eye-diseases treated by Dr. Stör in 1881. Ratisbon, 1882, 1,237 patients; 10 extractions, 8 with $V=1-\frac{1}{10}$, 2 with $V=\frac{1}{10}-\frac{1}{100}$.

In 1880, 2,647 new patients were treated in the St. Thomas Hospital: 46 extractions; 39 iridectomies; 34 enucleations; 4 sclerotomies. In 1881, 2,620 patients were treated: 51 extractions; 41 iridectomies; 36 enucleations. NETTLESHIP.

DONDERS (3) treated 2,300 new patients: 42 extractions according to v. Graefe; 73 iridectomies; 36 tenotomies; 10 sclerotomies.

In the Munich ophthalmic clinic (4) 300 iridectomies were performed on 257 persons, 43 of whom were operated on both eyes, 123 only on the left and 90 only on the right; 37 persons were operated on both eyes at the same time. If the first operation went smoothly, the second was done at once; but if there were any irregularities, the operation on the other eye was postponed. For optical purposes 35 iridectomies were performed for central corneal opacities, 68 for adherent leucoma, 6 for partial staphyloma, 26 for closure of the pupil, 1 for anterior polar cataract. As an antiphlogistic iridectomy was performed in 68 cases. For prophylactic purposes, either to protect the other eye against sympathetic ophthalmia or to preserve the shape of a blind eye, iridectomy was done in 22 cases. 56 iridectomies were performed for glaucoma.

The eye having been carefully cleansed, an application of a solution of boracic acid is made a few hours before the operation. During the operation the other eye is covered. Graefe's knife is only used when the anterior chamber is very shallow, the sclera hard and rigid, or the globe very soft. The point of entry always lies in the sclera, except when it is desired to obtain a small pupil, when it lies in the cornea; this was done in 27 cases. The straight lance-shaped knife is only used for an iridectomy outward, the narrow one for an iridectomy for optical purposes, the broad one in glaucoma. The incision is made in the line of a tangent, and the wound enlarged when the knife is withdrawn. The length of the wound of an optical iridectomy is 3-4 mm.; in glaucoma 6-7 mm. The iris is abscised with Wecker's scissors. Borated lint and salicylated cotton are used for bandaging. The

following complications occurred during the operation : in 5 cases, prolapse of vitreous ; in 1, dislocation of the lens ; in 18, profuse hemorrhage ; in 12, after-hemorrhage. These hemorrhages are of importance for the prognosis (observed by the REV. in cases of general dyscrasia) ; in one case injury of the lens. The iris healed in the scleral wound in 12 cases. The iridectomies performed for antiphlogistic purposes were generally more successful than those for optical purposes. The best results were obtained in anterior polar and zonular cataracts and in simple corneal opacities. As for glaucoma, the chances for the restoration of sight by an iridectomy are most favorable when it is acute.

The subsequent treatment consisted in uninterrupted decum-bence for the next three days, both eyes being carefully bandaged ; they were not opened until the fourth day. On the fifth day the patients can get up. Only liquid food is given the first three days, on the fourth semi-liquid.

STEFFAN (7) treated 5,574 patients. 421 operations were performed : 41 operations on the lens and 25 extractions of senile cataract ; 21 good results, 2 medium, 2 failures. 22 iridectomies ; 8 of them for opitcal, 11 for antiphlogistic, purposes. 19 tenotomies.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY AND DIAGNOSIS.

1. ADAMS. On the value of uniocular diplopia as a symptom. *Trans. Ophth. Soc. Unit. Kingd.*, vol. ii, pp. 199-205.
2. BERGER. A peculiar form of connective tissue in the papilla and retina. *Klin. Monatsbl. f. Augenheilk.*, Aug. 1882.
3. CHARNLEY. Keratotomy. *Roy. Ophth. Hosp. Rep.*, vol. x, 3, p. 344, Aug., 1882. Discussion of the theory ; he proposes to call it "Cuignet's method." FIZGERALD.
4. EVERSBUCH. Contributions to the development of the serous cysts of the iris. *Mittheil. aus der Königl. Univ. Augen-klinik zu München*, vol. i.
5. FITZGERALD. On a case of remarkable deficiency of visual acuteness in a seaman. *Trans. Ophth. Soc. Unit. Kingd.*, vol. ii, p. 182.
6. GALEZOWSKI. De la valeur séméiologique des phénomènes visuels chez les cataractés. *Rec. d'ophth.*, Dec., 1882.

7. HILBERT. A peculiar anomaly of pigmentation of the fundus. *Klin. Monatsbl. f. Augenheilk.*, Aug. 1882. Black spots upon the papilla and black staphyloma posticum.

8. JAVAL. Seconde contribution à l'ophthalmométrie. *Ann. d'ocul.*, July and Aug. 1882.

9. LANDMANN. On the action of foreign bodies aseptically introduced into the eye. *Arch. f. Ophth.*, vol. xxviii, 2.

10. LEBER. Communication on the action of metallic foreign bodies in the interior of the eye. *Arch. f. Ophth.*, vol. xxviii, 2.

11. LOISEAU. Application à l'examen des hommes de guerre du procédé de détermination de la refraction dit kérato-scopie. *Ann. d'ocul.* Sept.-Oct., 1882.

12. MAYERHAUSEN. The etiology of hydrophthalmus. *Centralbl. f. prakt. Augenheilk.*, Aug., 1882.

13. PARINAUD. De l'exagération des reflexes pupillaires. *Soc. de biol.*, July 22, 1882. *Gaz. d'ophth.*, No. 9. *Compt. rend. hebd. de la soc. de biol.*, No. 28.

14. PARROT. Sur un phénomène pupillaire observée dans quelques états pathologiques de la première enfance. *Rev. de méd. de Paris*, Oct. 1882.

15. SCHIÖTZ. Om nogle optiske egenskaber ved cornea. *Nord. Med. Arch.*, 1882, vol. xvi, No. 28.

16. SCHULTÉN. Experimentella och kliniska undersökningar beträffande hjärnskador och deras inflytande på ögats cirkulationsförhållanden. Helsingfors, 1882.

17. TALKO. Injuries to the eye of conscripts and recruits. *Gaz. lekarska*, 1882, No. 27. Among 59 persons 31 had artificial traumatic cataract of the right eye.

18. ULRICH. The anatomical changes in chronic inflammations of the iris. *Arch. f. Ophth.*, vol. xxvii, 2.

BERGER (2) found bright, silvery strands, with fine longitudinal striation in the papilla and its neighborhood. They always lie near the inner surface of the retina. The retinal blood-vessels are normal; also vision. They were always found in one eye only. Perhaps they are the remnants of neuroretinitis in earliest childhood or intra-uterine existence.

EVERSBUSCH (4) adopts the theory of Wecker in explaining the development of the cysts of the periphery of the iris, according to which they are nothing but encysted aqueous humor. Cysts of

the iris due to the existence of an irido-corneal scar develop in a somewhat similar manner ; anterior synechias are more or less liable to lead to the development of cysts in the anterior chamber.

FITZGERALD (5) examined a naval officer who had served twelve years, whose vision in the right eye was fingers at $3\frac{1}{2}$ ft., in the left $=\frac{1}{18}$. Color perception normal. NETTLESHIP.

GALEZOWSKI (6) discusses the visual disturbances observed in incipient cataract, such as mouches volantes, photophobia, seeing rainbow-colors, diplopia, diminution of sight, acquired myopia, and reduction of the power of accommodation. The myopia according to him is real and due to increased thickness and density of the lens. MARCKWORT.

According to JAVAL (8) the optical examination of the eyes is not more useful than the ophthalmoscopic, but can be resorted to more frequently. MARCKWORT.

LANDMANN (9) tries to prove Leber's opinion, that aseptic foreign bodies within the eye do not injure it, by analyzing the cases published.

LOISEAU (11) determines refraction, including astigmatism, by noting the shifting of light and shadow upon the retina, as seen when light is thrown into the eye with a concave mirror and the latter slightly rotated. MARCKWORT.

MAYERHAUSEN (12) saw hydrophthalmus develop during den-tition under the symptoms of acute glaucoma. Eserine proved very efficient.

PARINAUD (13) noticed that in some cases the spinal myosis increased under the influence of light and convergence. The tendon-reflex is frequently more marked. v. MITTELSTÄDT.

PARROT (14) observed mydriasis during coma in fifteen cases of chronic infantile affections of the brain, as soon as he pinched the skin more severely. MARCKWORT.

SCHÜTZ (15) shows that the colored rings of glaucoma are a phenomenon of diffraction. The surface of the cornea becomes opaque in consequence of the increasing tension, which when continued may even produce detachment of the epithelium. The diameter of the colored rings coincides with the micrometric measurements of the epithelial cells. OLE BULL.

SCHULTÉN (16) discusses the vascular system of the eye and brain and their relation to each other ; the influence of cerebral

pressure and commotion of the brain on the circulation of the blood in the eye. He has examined the elasticity of the sclera, and found that it is quite considerable for low pressures, but soon diminishes and becomes very small under a pressure of 30-40 *mm.* Hg. The intra-ocular tension varies between 15 and 30 *mm.* After death the tension sinks, but becomes constant, at 10 *mm.* Hg, below which it does not fall, even when the eye is enucleated. When the intra-ocular tension is increased, the flow of blood into the blood-vessels of the retina and choroid becomes intermittent at a certain point, when the intra-ocular tension approaches the minimum of pressure in the ophthalmic artery; the flow of blood entirely stops when the intra-ocular tension exceeds the maximum of pressure in the artery. The pressure in this artery, which may thus be measured, is found to almost equal that in the larger blood-vessels. The quantity of blood and the intra-ocular tension depend upon: the lateral pressure in the blood-vessels of the eye, their tonus, their elasticity, the quantity of liquid in the eye, and the external pressure. When the intracranial pressure is increased, choked disc results. This condition develops even when the cranial pressure is comparatively low, and long before the dangerous symptoms on the part of the medulla manifest themselves, and is therefore of great importance for the diagnosis. Choked disc is observed especially when there is diffuse pressure due to effusions into the subdural and subarachnoidal spaces, but also in cases of local limitation of space within the cranium.

SCHIÖTZ.

ULRICH (18) found that when there was an increase of tension there was also always obliteration of the blood-vessels, hyaline degeneration of their walls, fibrous thickening of the iris, and enlargement of the small blood-vessels at the pupillary margin. Similar changes take place in those cases also in which there is no marked increase of tension.

b.—THERAPEUTICS.

1. CHIBRET. La manière la plus simple de pratiquer la sphinctérotomie et la pupille optique. *Arch. d'ophth.*, vol. ii, No. 6.
2. SNELL. On the use of the electro-magnet. *Brit. Med. Journ.*, Dec. 30, 1882.
3. STRISOWER. Marle bandage in operations on the eye. *Wratsch.*, No. 26. The paste-marle bandage remains immovable, and is therefore to be recommended for unruly patients.

In performing extraction, CHIBRET (1) introduces the pince-ciseaux closed, opens the branches as soon as their points project beyond the sphincter, and then closes them, at the same time pressing slightly against the iris, thus excising a triangular piece which is either removed at once with the instrument or later. He recommends this procedure for optical pupils also, as it is possible thus to control the size of the coloboma. v. MITTELSTÄDT.

SNELL (2) successfully made use of the electro-magnet in fourteen cases. In six the foreign body was removed from the lens and sight restored. In seven cases the foreign body was extracted from the vitreous. Twice the magnet failed.

FITZGERALD.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

1. ALBERTOTTI. Telemetria. *Ann. d' ottalm.*, vol. xi, 5.
2. ALBERTOTTI. Experimental measurement of the inverted image. *Klin. Monatsbl. f. Augenheilk.*, p. 355. Illustrated description of an apparatus designed by him.
3. CHARNLEY. On keratotomy. *Oph. Hosp. Rep.*, vol. x, p. 344.
4. CHARPENTIER. Sur quelques usages du trou sténopéique. *Arch. d' ophth.*, vol. ii, 3.
5. FUCHS. Proposal to construct an ophthalmoscope with a new device for reflection and polarization. *Zeitschr. f. Instrumentenkunde*, vol. ii, 9.
6. GALEZOWSKI. Ophthalmoscope à réfraction et à double foyer. *Rec. d' ophth.*, July, 1882; *Four. de therap.*, July, 1882; *Centralbl. f. prakt. Augenheilk.*, p. 247.
7. JULER. The theory and practice of retinoscopy in the diagnosis of errors of refraction. *Ophth. Rev.*, vol. i, 12.
8. MAYERHAUSEN. Test-numbers for determining the acuteness of vision according to Snellen's formula— $V = \frac{d}{D}$. Berlin, 1882.
9. MOYNE. Ottimetro modificato, *Boll. d' ocul.*, vol. v, 4.
10. WECKER and MASSELON. Astigmomètre. *Ann. d' ocul.*, July and Aug., 1882.

ALBERTOTTI (1) has attached the glass-plates of Helmholtz' ophthalmometer to the terrestrial telescope, as he has already

done to the ophthalmoscope and microscope, and expects to obtain good results with this combination, especially in regard to the quickness of telemetric determinations. DANTONE.

FUCHS (5) does away with the corneal reflex by means of a nicol, which also replaces the mirror, or simple glass-plate, respectively. The lens, which acts as a simple microscope, is so placed that it unites the rays emerging from the eye examined in the pupil of the observer.

The ophthalmoscope of GALEZOWSKI (6) is intended for examination both in the upright and inverted images. A smaller mirror of 8 *cm.* focal length, is placed in the centre of a larger concave mirror of 25 *cm.* focal length. The latter is intended for examination in the inverted, the former in the upright, image. The glasses for determining refraction are inserted into a rotating disc. MARCKWORT.

MAYERHAUSEN (8) claims for his plates the following advantages : 1, They are constructed on the same principle as the Latin test-types ; 2, the numbers are more readily recognized than the complicated gothic letters ; 3, many persons who cannot read are familiar with numbers ; 4, they are adapted for the examination of children under school-age, who frequently know numbers but no letters.

MOYNE (9) has constructed an optometer without a tube, by placing in one of the foci of a double convex lens the eye to be examined, in the other a reduced plate of types. If, in order to be seen distinctly, the latter must be approached, there is myopia ; if it must be removed beyond the focus, hypermetropia. The lens is chosen so that an approach or removal of 4 *mm.* corresponds to an error of refraction of 1 D. DANTONE.

WECKER and MASSELON (10) have constructed a very simple instrument for determining corneal astigmatism. The white frame of a black square, with a small hole in its centre for the eye of the observer, is held at some distance from the eye to be examined ; this frame forms a square image upon a non-astigmatic cornea, while, upon an astigmatic cornea, it takes the shape of an irregular quadrangle or of a rectangle ; the latter is the case where one side of the frame is parallel to the one at the principal meridians, which may easily be accomplished by revolving the square. Thus, one of the axes is found ; the degree of astigmatism may approximately be determined from the shape of the rectangle,

which is compared with ten different quadrangles accompanying the apparatus. The first of these is square; in the succeeding ones, the length of two of the parallel sides diminishes, while that of the two others increase. (Comparison seems to show that Placido's keratoscope is more practical than Wecker-Masselon's astigmatometer, as the eye more readily observes a deviation from the form of a circle than of a square. Both Placido's circular and Wecker-Masselon's square disc can be easily constructed.—REV.) MARCKWORT.

b.—REMEDIES.

1. CASAGEMAS. Antisepsis in Dr. Barraquer's clinic. *Gaceta médica Catalana*, No. 35, June, 1882.
2. DEHENNE. De l'action de la pilocarpine dans les affections oculaires. *Rev. d' ocul. du sud-ouest*, vol. iii, No. 10.
3. DEMAN. De la pilocarpine, son action dans la thérapeutique oculaire. *Thèse de Paris*, Aug., 1882.
4. ELLABY. Action de la strychnine et du courant constant sur l'œil normal. *Arch. d' ophth.*, vol. ii, No. 6. Strychnine and the constant current (the negative pole on the temple, the positive on the eye, six elements) increase the extent of the field of vision, especially inward in the horizontal meridian. The maximum is not obtained until after several applications. The increase and return to the normal is more rapid for red and green than for white and blue. v. MITTELSTÄDT.
5. FRONMÜLLER. Neutralizing the action of pilocarpine with homatropine. *Memorabilien*, vol. ii, 5.
6. GUTIEREZ. Ensago sobre la accion fisiológica y terapeutica del jaborandi. *Dissert.*, Guatemala.
7. HÖGYES. The action of some chemical substances upon the associated movements of the eyes. Investigated by Kovács and Kertész. *Arch. f. experim. Pathol.*, vol. xvi, 1 and 2.
8. LANDESBURG. Accidents from the use of jaborandi and pilocarpine in diseases of the eye. *Phila. Med. Times*, July 29, 1882.
9. MASINI. La resorcina nelle malattie degli occhi. *Boll. d' ocul.*, vol. iv, No. 12, August, 1882. An antiseptic which does not irritate in conjunctivitis, affections of the lachrymal sac, hypopyon-keratitis (0.05. = 0.2. : 30.0). DANTONE.

10. MILLES. Atropine ointment. *Roy. Lond. Ophth. Hosp. Rep.*, vol. x, p. 387, Aug., 1882. Atropine ointment is much to be preferred to the solution. FITZGERALD.

11. MINOR. Duboisine for photophobia. *Virginia Med. Monthly*, Sept., 1882. Photophobia in keratitis disappeared very rapidly when duboisine was used, but not after atropine. BURNETT.

12. PEÑA. El nitrato y chlorhidrato de pilocarpina. *Oftalm. prat.*, vol. i, No. 6; and Jequirity, *Oftalm. prat.*, November.

13. PROUBINSKY. The use of antiseptic solutions of atropine and eserine. *Vratchebnia Vedomosti*, 1882, No. 20. They are made antiseptic by adding one or two drops of an alcoholic solution of phenic acid (50 %).

14. REINHARD. The pressure in the anterior chamber and loss of corneal substance under atropine and eserine. *Inaug. Diss.*, Basel, 1882.

15. SNELL. Hyoscine. *Ophth. Rev.*, vol. i, Oct., 1882. More energetic mydriatic than atropine. FITZGERALD.

16. SNELL. Antiseptic solution of atropine. *Ophth. Rev.*, vol. i, Oct., 1882. Irritates less.

CASAGEMAS (1) describes the antiseptic method of Barraquer, who uses a 4 % solution of boracic acid for washing and disinfecting the instruments, the field of operation, and the operator; for disinfecting the wound, an 8 % (?) solution is used. Borated lint, salicylated cotton, and rollers of phenol-gauze are used for bandaging. Phenol is only used when there is considerable conjunctival secretion; otherwise always a solution of boracic acid.

According to the investigations of HÖGYES (7), the bilateral equilibrium of both eyes is disturbed when considerable quantities of the following substances are introduced into the circulation: chloroform, ether, morphine, codeine, picrotoxine. In the course of asphyxia there are also disturbances of the movements of the eye. Involuntary associated deviations and nystagmic oscillations set in, which are very peculiar in poisoning with chloroform, ether, and probably, also, codeine, and in asphyxia; while in poisoning with morphine and picrotoxine, there are slight twitchings of the globes, whose direction cannot be determined.

Under chloroform vertical nystagmus first sets in, or without it convergent bilateral strabismus, which slowly changes to divergent strabismus, until finally the primary position is again attained.

These movements are repeated several times during the narcosis. Under ether inferior lateral deviation, with lateral rotation, develops either with or without vertical nystagmus, from which position the eyes slowly return to the primary one. Under codeine horizontal bilateral nystagmus develops.

REINHARD (14) finds that atropine acts directly as a regenerator in corneal affections, while eserine, although it diminishes the tension in the anterior chamber, directly hinders regeneration. Eserine should only be used in marginal ulcers for producing more rapid vascularization, but must be stopped as soon as this is attained; when the ulcers are well vascularized, it is contra-indicated.

IV.—ANATOMY.

a.—GENERAL ANATOMY.

1. DURLACH. Observations on cases of malformation and checked growth of the eye. *Inaug. Diss.*, Bonn, 1882.

2. FARENECKY. Anatomy and physiology of cyclopia in man. St. Petersburg, 1882. General description based on the observation of ten cases.

3. GIACOMINI. Annotazioni sopra l' anatomia del negro. *Giorn. d. R. Acad. di Med. Torino*, 1882, Nos. 10 and 11.

4. MANDELSTAMM. A case of congenital microphthalmus. *Centralbl. f. pract. Augenheilk.*, October.

5. MONDIÈRE. Monographie de la femme Annamite, suivie de recherches sur les femmes Chinoises Min-Huöngs et Cambodgiennes. *Mém. de la soc. d' anthrop. de Paris*, vol. ii, 2 series, No. 4.

6. SCHAUMBERG. Cases of malformation of the eye. *Inaug. Diss.*, Marburg, 1882.

7. SZIKLAI. Congenital bilateral anophthalmia with subsequent development of the globes. *Wiener med. Wochenschr.*, No. 32.

Based on the observation of three cases of bilateral anophthalmia, unilateral microphthalmia, and bilateral microcornea DURLACH (1) discusses these malformations. In anophthalmia the globes are either entirely wanting or exist only in the shape of small round bodies. The adnexa however are there; the lids, for instance, are almost always well developed, though in a few cases there was no indication of them. The muscles are almost

always well developed, even when there is no trace of the globes. The lachrymal apparatus is generally to be found, though sometimes imperfectly developed. The optic nerve is generally missing, and frequently, also, there is a defect of certain portions of the brain. Generally there are other malformations besides anophthalmia.

Microphthalmia consists in more or less marked smallness of the globe and its adnexa. The margin of the cornea is frequently opaque, and colobomas of the iris are of very common occurrence. There may be no power of vision, or it may be more or less well developed. Generally both eyes are affected.

Cases of pure monophthalmia are rare. One eye may be normal, while the other is wanting or rudimentary. There is no marked boundary between microphthalmia and anophthalmia; frequently a close investigation reveals microphthalmia where a macroscopic examination seemed to show anophthalmia. Among the etiological factors must be placed syphilis of the father, consanguinity of the parents, heredity.

The author then adds a list of cases published since 1876.

Four years ago GIACOMINI (3) had discovered cartilage in the semilunar fold of two negroes. Since then he had an opportunity to examine six more bodies of negroes and found this peculiar formation in four of them; it was missing in the other two, who were, however, not of the pure negro race, but Egyptians. An examination of the semilunar fold of whites revealed this abnormality in only four instances,—three in 297 males, one in 251 females. Giacomini therefore believes that this cartilage is a peculiarity of the negro, similar to that of the Melanesians and Micronesians, whose semilunar fold is abnormally large in proportion to that of whites. (*Miklucho-Madag. Anthropologische Notizen*, 1876.)

DANTONE.

Besides other observations MONDIÈRE (5) measured the obliquity of the aperture of the lids in various Mongolian tribes. It is least among the Chinese. In men it is generally less than in women. It seems to be directly proportional to the degree of brachycephalia.

V. MITTELSTÄDT.

SCHAUMBERG (6) describes various kinds of malformation; for instance: 1. Bilateral corectopia upward, observed in a young woman of twenty-three, and also in her younger brother; the refraction was M $\frac{1}{4}$; vision reduced, the field of vision somewhat

limited upward. 2. Unilateral corectopia. Irregular notches in the upper edge of the lens; the sphincter of the iris preserved; the pupil displaced upward and inward; vision reduced. 3. Coloboma of the choroid, observed in four cases. 4. Bilateral anophthalmus and cyst of the left lower lid. The adnexa of the eye are developed; the cyst is probably the result of degeneration of the globe. 5. Anophthalmus and microphthalmus. The rudiment of a globe has an elliptical shape, tension diminished; it is, therefore, probably the result of intra-uterine irido-cyclitis; the right orbit, containing the microphthalmus, is larger in all its dimensions than the left without a globe. 6. Microphthalmus and microcornea. 7. Bilateral microphthalmus with normal cornea; the father and grandfather likewise had congenital microphthalmus. 8. Bilateral microphthalmus combined with a linear, horizontal pupil. In this case the left eye was very obliquely placed, and its vision very poor. 9. Melanosis of the sclera. The lower outer quadrant of the left eye is of a dark violet color to a width of 6 mm.; a lighter shade of the same color extends at a distance of 2 mm. from the corneal margin entirely around the cornea. The pigment lies under the conjunctiva in the sclera. 10. Double-contoured nerve-fibres on the papilla, observed in five cases.

b.—LIDS, CONJUNCTIVA, CORNEA, LACHRYMAL APPARATUS.

1. HÖNE. Contributions to the histology of the cornea. *Med. Jahrbücher d. K. K. Gesellsch. d. Aerzte zu Wien*, 1882.

2. VON MISES. The nerves of the human lids. *Sitzungsber. d. K. Acad. d. Wissensch.*, Abth., iii, vol. lxxxv, 1882.

3. PREISS. Further contributions to the question of the permeability of the substance of the cells itself. 1. The relation of the corneal fibres (or lymph-ducts) to the corneal cells. 2. The circulation in the capillaries of the corneal margin is an intracellular current. *Virchow's Arch.*, vol. lxxxix, No. 1.

4. SASSE. The chemistry of Descemet's membrane. *Untersuch. a. d. phys. Inst. d. Univ. Heidelberg*, vol. ii, 4. Its chemical composition differs from that of the glutinous and elastic tissues, and the membrana propria of the cornea. The action of trypsin upon Descemet's membrane is more closely investigated.

HÖNE (1) has investigated the senile changes of the cornea. The offsets of the corneal cells are gradually converted into elastic

plates and films, while the nuclei seem to be changed into the same substance as the cells ; they can no longer be stained with advancing age.

VON MISES (2) reports as follows in regard to the innervation of the lids : The nerves entering the nasal and temporal ends of the lid form an intricate net-work occupying the region over the follicles of the lashes, and called the border plexus ; from this plexus branches go to the skin, muscles, lashes, and conjunctiva. Branches reach the conjunctiva with the small blood-vessels which enter the tarsus between the lobules of Meibom's glands, while others go to it in the region of the cul-de-sac. Most of these nerve-fibres lose their medulla when they enter the conjunctiva. The lashes also receive nerve-fibres from the border plexus ; they possess a nervous apparatus which marks them as organs of touch. The apparatus consists of a ring of nerve-fibres surrounding the follicle.

C.—VITREOUS AND LENS.

1. BECKER. The structure of the lens. *Ber. über d. xiv. Versamml. d. ophth. Gesellsch.*, Rostock, 1882, p. 174.
2. BERGER. Contributions to the anatomy of the zonula Zinnii. *Arch. f. Ophth.*, vol. xxviii, 2.
3. EVERSBUCH. Clinico-anatomical contributions to the embryology and teratology of the vitreous. *Mittheil. aus der Kgl. Univ. Augenklinik zu München*, vol. 1.
4. HÄNSELL. The structure of the vitreous. *Ber. über d. xiv. Versamml. d. ophth. Ges.*, Rostock, 1882, p. 109.
5. MAGNI. Considerazioni intorno alla formazione e costituzione definitiva del vitreo nell'occhio umano e intorno ai distacchi di jaloide esistenti nella sezione patologica della collezione anatomica della clinica oculistica di Bologna. *Rivista clinica*, 1882.
6. ROBINSKI. Investigations in regard to the so-called eye-lens fibres. *Arch. f. Augenheilk.*, vol. xi.

BERGER (2) comes to the following conclusions : 1. The pars ciliaris consists of cylindrical cells with supporting fibres between them, the latter apparently in connection with the hyaloid membrane covering the inner surface of the pars ciliaris retinæ. The supporting fibres and the elements of the supporting tissue in the retina are not digested in a solution of pepsine ; but this digests the cylindrical cells, the hyaloid membrane, and the inner ends of the supporting fibres connected with it. 2. The hyaloid membrane

of the pars ciliaris retinæ is the continuation of the internal limiting membrane ; it covers the posterior surface of the iris to the pupillary margin. 3. The zonula originates in the vitreous, with a small number of delicate fibres. 4. The zonula is in close apposition to the pars ciliaris retinæ in the ciliary ring and in the posterior part of the ciliary processes. In the middle portion the zonula is only connected with the ridges of the ciliary processes and the small elevations lying between them. In the anterior portion the zonula is only connected with the ridges of the ciliary processes. 5. Between the zonula, the ciliary body, and its processes little cavities are formed by the zonula stretching across the depressions between the ciliary processes and not adapting itself to the deeper parts of the ciliary body. These spaces communicate with the posterior chamber, but not with each other. 6. Fibres enter the zonula from the internal limiting membrane and its continuation, the hyaloid membrane of the pars ciliaris retinæ. The latter are generally somewhat longer. They extend inward and forward from behind and outward. Their entry into the zonula explains the increase in the number of fibres in the anterior part of the zonula. These fibres are either single or arranged in lamellæ. In the middle and anterior portions of the ciliary body they lie in the cavities formed by the zonula of the depressions between the ciliary processes. 7. The zonula is attached by means of delicate short fibres to the ciliary processes. They extend partly forward, partly backward, after entering the zonula ; the latter direction, however, is rather rare. 8. A few nuclei may be found in the zonula of young persons ; they are numerous in the new-born and the fœtus of six or seven months. In a fœtus six months old, fine capillaries were found in the zonula, though it could not be decided whether they belonged to the zonula or the vitreous. 9. The surface of the zonula bounding the posterior chamber is covered with delicate endothelium, which was observed in a human fœtus seven months old. It was also observed on the posterior surface of the iris and the parts of the posterior portion of the zonula not united with the ciliary body.

After discussing a case of peculiar checked growth in the vitreous EVERSBUSCH (3) describes the embryological development of the vitreous of various animals. His remarks may be summed up as follows : The blood-vessels springing from the hyaloid artery during intra-uterine life, and spreading through the vitreous, and the products derived from the mesoblast projecting into it, are not

primarily intended to furnish nutrition for the development of the vitreous itself, but of the retina, as far as supplying the latter with blood-vessels is concerned. They also seem to be of importance for the development of the zonula Zinnii. On account of their connection with the capsulo-pupillary and pupillary membranes, they are important for the formation of the anterior portion of the uveal tract, as long as the permanent blood-vessels have not been developed. Not until all this has been accomplished does the organization of the vitreous begin. After the capsulo-pupillary membrane has entered into connection with the iris, the blood coming from the vitreous is discharged in two ways: 1. Through the blood-vessels of the iris. 2. Through the loops at the zonula into the central retinal vein. Later the communication between the iris and pupillary membrane becomes atrophic, probably due to the development of the blood-vessels of the iris; then the blood-vessels of the anterior capsule of the lens disappear, and as the loops at the zonula retract, the connection between the blood-vessels of the posterior capsule of the lens and the anterior surface of the retina is broken. The iris is thus first in obtaining an independent supply of blood-vessels, then comes the zonula Zinnii, and finally the retina and vitreous.

d.—RETINA.

1. W. C. AYRES. The chemical reaction of the visual purple. *Untersuch. aus dem physiol. Inst. d. Univ. Heidelberg*, vol. ii, 4.
2. CHITTENDEN. Contributions to the histo-chemistry of the visual epithelium. *Untersuch. aus dem physiol. Inst. d. Univ. Heidelberg*, vol. ii, 4.
3. DEUTSCHMANN. The effect of direct sunlight on the retina. *Arch. f. Ophth.*, vol. xxviii, 3.
4. HELFREICH. The venous pulse of the retina and intra-ocular circulation. *Arch. f. Ophth.*, vol. xxviii, 3.
5. KÜHNE. Observations on the anatomy and physiology of the retina. *Untersuch. aus dem physiol. Inst. d. Univ. Heidelberg*, vol. iv, 3.

According to AYRES (1) a solution of visual purple is discolored by adding a solution of trypsin, as the purple is decomposed. Visual purple contained in an undissolved state in the retina, however, is not affected by the trypsin solution, the color remaining unchanged.

DEUTSCHMANN (3) has found that direct sunlight produces changes in the retina similar to those of disseminate choroiditis. The retina is converted into a more or less structureless mass, the albumen being coagulated. Regeneration does not take place. The blood-vessels of the choroid in the region affected are widely distended, and small hemorrhages and little round nodules enclosed in spindle-cells are found.

According to HELFREICH (4) two kinds of pulsation may be observed on the disc and retina in insufficiency of the aorta : 1. The so-called capillary pulse at the entrance of the optic nerve, consisting in a rhythmic change of color of the papilla, reddening during the systole and paling during the diastole. 2. The pulse of the arteries of the optic nerve and the retina ; it is characterized by a variation in the diameter of the blood-vessels, *i.e.*, the alternation between diastole and systole of the arteries, and an elongation and movement of the branches of the arteries.

KÜHNE (5) examined the eyes of an executed criminal immediately after the execution, and found that the color of the retinal rods was but slightly faded after using the eyes for several hours in moderate but sufficient light. There is no visual purple in the retina of several nocturnal animals, for instance, *caprimulgus europæus* and *vespertilio serotinus*.

2.—OPTIC NERVE AND BRAIN.

1. GANSER. The peripheral and central arrangement of the optic-nerve fibres and the corpus bigeminum anterius. *Arch. f. Psychiatric*, vol. xiii, 2.

2. KNIES. The question of injecting the optic nerve. *Klin. Monatsbl. f. Augenheilk.*, Aug., 1882.

3. PFLÜGER. On injecting the optic nerve. *Ber. über die xiv. Versammlung d. ophth. Gesellsch.*, Rostock, 1882, p. 124.

4. VOSSIUS. A case of bilateral central scotoma and the pathological and anatomical condition. Contribution to the knowledge of the position of the fibres of the macula in the optic nerve, chiasm and optic tractus. *Arch. f. Ophth.*, vol. xxviii, 3.

GANSER (1) found that in the cat the uncrossed optic-nerve fibres extend in the chiasm and nerve along the lateral edge as a united fascicle, which also slightly covers the crossed fascicle on its dorsal surface ; between the two an exceedingly small zone of mixed fibres may exist. The uncrossed fibres thus constitute a

real lateral fascicle in the cat. The uncrossed is smaller than the crossed fascicle.

KNIES (2) enters into a discussion with Kuhnt, who had denied the possibility of injecting the optic nerve. Knies shows that by exercising proper precaution they always succeed. PFLÜGER (3) confirms the results of Knies.

According to VOSSIUS (4) the fibres which supply the macula are situated in the tractus at the central edge and in the upper outer quadrant in two separate regions; in the chiasm they lie immediately beneath the surface of the optic recessus, remain there also more in the dorsal half, and occupy the centre in the intracranial portion of the optic nerve as far as the optic foramen; then they change their relative position and also the shape of the fascicle. While they previously resembled an oval, they assume the shape of a more upright oval near the orbit, an almost sickle-shaped figure, which immediately behind the optic foramen does not occupy the centre, but rather the temporal side. Then they remain on the temporal side, finally reach the temporal edge at the entrance of the central retinal blood-vessels, and continue to the papilla from this point in the lower outer sector of the cross-section of the optic nerve in shape of a wedge, whose base is formed by the surface of the optic nerve, the apex by the central blood-vessels.

f.—COMPARATIVE ANATOMY.

1. BERLIN. The normal fundus oc. of the horse. *Zeitschr. f. vergl. Augenheilk.*, 1882, No. 2. Excellent colored illustrations.
2. BERLIN. Ophthalmoscopic images. *Ber. über d. xiv. Versamml. d. ophth. Gesellsch.*, Rostock, 1882, p. 168. Fundus of the horse.
3. BORN. The nasal cavities and the nasal duct of the amniotic vertebrates. *Morph. Jahrb.*, vol. viii, 2.
4. BRUNS. Studies in comparative anatomy on the vascular system of the retina. *Zeitschr. f. vergl. Augenheilk.*, 1882, No. 2. He discusses: the horse, calf, sheep, pig, dog, cat, rabbit, guinea-pig, and rat. The proposed nomenclature of the retinal blood-vessels has already been described by Magnus in 1873.
5. EXNER. The function of the Cramptonian muscle. *Sitzungsber. d. K. Acad. d. Wissensch.*, 1882, vol. iii, p. 52. Aids accommodation; corresponds to the tensor chorioideæ of mammals.

6. HIRSCHBERG. The dioptrics and ophthalmoscopy of the eyes of fishes and amphibia. *Arch. f. Anat. u. Physiol.*, physiol. Abth., 1882, Nos. 5 and 6.

7. KÜHNE. Contributions to optochemistry. *Untersuchungen aus dem physiol. Inst. d. Univ. Heidelberg*, vol. iv, No. 3. On chromophane in the retina of birds.

8. LEGAL. The nasal cavities and the nasal duct of the amniotic vertebrates. *Morphol. Jahrb.*, vol. viii, p. 353.

9. PREUSSE. On the tapetum of the domestic mammals. *Arch. f. Thierheilk.*, vol. viii, p. 264, 1882.

10. PUFAHL. The eyes of birds. *Zeitschr. d. Verbandes d. ornithol. Vereine Pommern's u. Mecklenburg's*, Nos. 5-7.

11. TARTUFFERI. Le glandule di Moll studiate nelle palpebre dell' uomo e degli altri mammiferi e comparate alle tubolari cutanee. *Arch. per le scienze mediche*, vol. iv, 5.

12. VANDERKINDERE. Nouvelles recherches sur l' éthnologie de la Belgique. Enquête anthropologique sur la couleur des yeux et des cheveux. *Rev. d' anthrop.*, vol. v, 2d series, No. 3, 1882.

13. H. VIRCHOW. Contributions to the comparative anatomy of the eye. Essay for habilitation, Berlin, 1882.

14. ZELINKA. The nerves of the cornea of the teleosts and their ending in the epithelium. *Arch. f. microsc. Anat.*, vol. xxi.

HIRSCHBERG'S (6) very interesting paper may be condensed as follows: The cornea of fishes, not being used in water, is no more developed than the reverse of the gable-statues of the old Greek sculptors. On the whole the cornea is flat in comparison with the length of the optical axis. In the eye of the pike, whose breadth of cornea equals that of man, but the length of whose optical axis is only one half that of man, the nasal part of the portion before the pupil is perceptibly more convex than the temporal portion. It would not be correct, however, to assume that in air also the cornea of fishes has no optical effect. In the eyes of such pikes it almost equals that of the human lens when set for the far-point. Just as the loss of the lens makes a normal human eye highly hypermetropic ($H \frac{1}{2}$ "), the eyes of fishes become highly myopic when in air on account of the action of the cornea. The far-point lies 1-3" in front of the fish-eye, according to the size of the latter. The degree of this myopia is about equalled by the refractive power of the cornea; it is probable therefore

that the fish-eye when under water is about emmetropic ; in reality it is slightly myopic. Viewed teleologically a low degree of myopia would seem quite practical, as even the clearest water is no longer transparent at greater distances. The optic-nerve fibres in the retina of various kinds of fishes are enveloped in a delicate sheath.

There is no power of accommodation in the eyes of frogs. Their lens is spherical and fills the globe almost entirely. There is no ciliary muscle. Probably the eyes of frogs are slightly myopic in air.

H. VIRCHOW (13) discusses various but connected questions in several chapters. In the first, he discusses the vitreous ; it is intersected in various directions by membranes enclosing a serous liquid, which membranes can be best demonstrated in the embryos of the smooth adder. The second chapter refers to the vitreous of fishes, which is similar, though there is a great difference in its density in eyes that have been in alcohol, making a difference in composition probable. In the third, he contends that there is only one membrane between vitreous and retina, which may easily be demonstrated in embryos of the smooth adder ; but he will not decide whether this condition is general. This membrane possesses considerable firmness, has no structure, is absolutely transparent, and highly permeable for the liquid contained in the vitreous. In the fourth chapter he divides the cells of the vitreous into three kinds—round, stellate, and smooth. The last mentioned are supposed, by some authors, to lie near the surface ; others deny their existence, so that discussion on them cannot yet be considered closed. Of the stellate cells the author says nothing. The round cells are the ones generally referred to ; they assume so many different shapes that they might be called variable cells. In the fifth chapter he speaks of the blood-vessels of the vitreous, in regard to which he recommends great caution, as they may develop wherever they are needed. The blood-vessels upon the surface of the vitreous, between it and the retina, belong to both, and sometimes serve the purpose of nutrition, sometimes of transudation. In the sixth chapter he treats of the development of the vitreous, in which transudation plays an important part. He owns that, morphologically, there is no difference between the vitreous cells of embryos of warm-blooded animals and roving cells, but does not believe that such a peculiar structure like the vitreous could develop only through general,

not local, influence. The seventh chapter, treating of the part played by the cells in the vitreous of adult animals, is mainly reflective and critical. The author admits, that as yet we know nothing of the influence of these cells. The last chapter treats of the eyes of seven species of fishes, and confines itself generally to the accommodative apparatus, and the "sickle-shaped" process. A comparative discussion on the veins of the choroid is important, though very short, as the investigations on which it is based are described in previous papers of the same author. The vortico-se veins are only the separated halves of two veins,—a dorsal and ventral one. The blood-vessels of the choroid are arranged, not on a radiate, but on a bi-lateral, type—the arteries entering in the horizontal meridian and the veins passing out above and below. The sickle-shaped process really forms a part of the vitreous; it varies in shape, has its own system of blood-vessels, and may or may not be pigmented.

The campanula is spherical or smooth, and parallel, to the posterior surface of the iris. It varies considerably in size and shape; its fibres extend from one side to the other, rising a little on the nasal side. The lens is attached by means of one or two membranes to the ora serrata; they vary very much in various kinds of fishes, as well as in their structure. Virchow formulates no theory of action based on these anatomical conditions, leaving it to the reader to form his own conclusions.

V.—PHYSIOLOGY.

a.—GENERAL PHYSIOLOGY.

1. ALBERTOTTI. Experimental measurement of the inverted image. *Klin. Monatsbl. f. Augenheilk.*, 1882, p. 335.
2. v. FLEISCHL. Notes on physiological optics. *Sitzungsber. d. Königl. Acad. d. Wissensch.*, vol. iii, June, 1882.
3. GENZMER. Investigations on the visual perception of the new-born. Halle, 1882.
4. DE HAAS. The commutation of light into excitation of vision. *Klin. Monatsbl. f. Augenheilk.*, July, 1882.
5. LANG and FITZGERALD. The movements of the eyelids in association with the movements of the eyes. *Trans. of the Ophth. Soc. of the Unit. Kingd.*, vol. ii, p. 217. *Lancet*, ii, 3.
6. MAGAARD. On the secretion of the lachrymal gland and its product. *Virchow's Arch.*, vol. lxxxix.

7. MAYERHAUSEN. On Maxwell's spot. *Arch. f. Ophth.*, vol. xxviii, 2.

8. PODNEW. The effect of sunlight on animals. *Ber. über d. Gesellsch. d. Aerzte zu Kasan*, 1882, Nos. 1-10.

9. SCHULTEN. The observation of the fundus under a high magnifying power. *Arch. f. Physiol.*, 1882, p. 285.

10. URBANTSCHITSCH. The influence of the external and the middle ear on the senses—especially sight. *Wiener med. Blätter*, No. 42.

Helmholtz explains the phenomenon (2) of a fine net, a rod, or a straight edge appearing wavy, by the anatomical condition of the retina or the cones of the yellow spot respectively. FLEISCHL does not accept this explanation, and asserts that a wavy impression is made upon the retina when the image passes over it with moderate velocity.

GENZMER (3) thus describes the development of sight in the new-born: the eyes are sensitive to light immediately after birth, and the pupils react promptly. When a strong light suddenly falls upon them they converge. A new-born child cannot follow an object with the eyes, but can fix upon it when in the line of vision. Perhaps this can be explained by an insufficient development of the optic tracts. The conclusion also follows that, at first, the child only has impressions of light and dark, which are mainly transmitted from the macula lutea. Convergence for the purpose of fixation was not observed until the fourth week. An energetic contraction of the ciliary muscle was observed with the ophthalmoscope in a child two weeks old, when convergence had been produced by strong light; this shows that there must be a preformed connection between convergence and accommodation. Colors are not noticed the first few months; white objects first attract the child's attention, no attention being paid to colored. The color sense begins to develop in the fourth month—red being recognized first, though white still takes precedence. It therefore follows that the new-born child is more affected by the quantity than the quality of light.

DE HAAS (4) thinks that the little discs of the outer part of the rods and cones are put into vibration by the ether-waves according to their thickness and coefficient of refraction.

MAYERHAUSEN (7) sees Maxwell's spot in shape of a six-pointed star, one point exactly directed upward and another down-

ward. The outer boundary gradually fades away; the inner is more clearly marked, and is formed by the bright and also stellate halo, which again encloses a dark, star-shaped figure. The latter resembles a four-pointed star whose points are divided. The same condition was observed in an albino.

PODNEW (8) reports as follows on the action of light: 1, it favors development; 2, strength diminishes more rapidly in the dark than in the light, when food is withheld; 3, light favors the repair of most tissues; 4, it increases the quantity of urine and carbonic acid; 5, it increases the pulse and respiration; 6, it increases the sensibility of the skin, and adds to the efficiency of the other senses also; 7, it favors the action of certain drugs—for instance, atropine.

URBANTSCHITSCH (10) has found that the perception of light is diminished by an affection of the ear; when the latter improves vision also improves. He thinks it is a reflex action of the fifth nerve.

b.—CORNEA, IRIS, AND REFRACTIVE MEDIA.

1. CASTALDI. Le arterie del tratto uveale anteriore e la genesi dell' acqueo. *Giorn. internaz. de scienze mediche*, vol. iv, Nos. 7 and 8.

2. DENISSENKO. The question of nourishment of the cornea. *Klin. Monatsbl. f. Augenheilk.*, Sept., 1882.

3. PFLÜGER. The question of nourishment of the cornea. *Klin. Monatsbl. f. Augenheilk.*, 1882, p. 372. Controversy with Denissenko.

4. SCHADOW. Contributions to the physiology of the movements of the iris. *Arch. f. Ophth.*, vol. xxviii, 3.

5. SCHULEK. The optical conditions in cases of double pupils. Defence of the formation of a pupil while leaving the sphincter uncut. *Arch. f. Ophth.*, vol. xxviii, 3.

According to CASTALDI (1) the aqueous humor is secreted by the ciliary processes during the contraction of the ciliary muscle; by the iris, on the contrary, when the pupil is wide. For this reason the muscular fibres of the walls of the arteries of the iris are longitudinally arranged, though at the ends they are of both kinds. In consequence the blood-pressure is only increased when the pupil is wide; the aqueous humor, which is then secreted, is conducted through lymphatic spaces to the pupillary margin, and is

there discharged into the anterior chamber. When the pupil contracts during accommodation the secretion from the iris ceases, so that the tension in the anterior chamber, already increased by the advancement of the lens may not be added to. The contraction of the sphincter of the iris is not synchronous with that of the ciliary muscle, but follows it, which would be meaningless if it were considered simply a manifestation of the act of accommodation. The author's experiments seem to show that the aqueous humor is principally discharged through the meshes situated in front of Schlemm's canal. The liquid enters the sub-conjunctival lymph-ducts a few millimetres from the corneal margin.

DANTONE.

DENISSENKO (2) enters into a controversy with Pflüger, and maintains: The cornea is nourished from the margin from the blood-vessels of the conjunctiva and sclera, toward the centre, and from in front backward. The lymph passes through Descemet's membrane and fills the anterior chamber. The upper and deeper layers are not nourished by any particular blood-vessels; the anterior chamber has nothing to do with the nourishment of the cornea. The theory that the aqueous humor nourishes the cornea is not new, as might be inferred from recent papers, it having been propounded by Stenonius more than two hundred years ago.

According to SCHADOW (4) the width of the pupil is not dependent upon the refraction. In youth (below 20) the pupil is at a maximum 2-3, at a minimum 1-1.5 mm wider than at a more advanced age.

C.—RETINA AND CENTRAL ORGANS.

1. BECHTEREFF. The function of the olives in the medulla oblongata. *Wratsch*, Nos. 34 and 35.
2. CHARPENTIER. Recherches sur la distinction des points lumineux. *Arch. d'ophth.*, vol. ii, No. 4.
3. CHARPENTIER. Note complémentaire relative à l'influence de la surface sur la sensibilité lumineuse. *Arch. d'ophth.*, vol. ii, No. 6.
4. CHARPENTIER. Sur la durée de la perception lumineuse dans la vision directe et dans la vision indirecte. *Gaz. d'ophth.*, No. 9.
5. TUMIM. The physiological relations of the ganglion cervicale supremum to the iris and the arteries of the head. *Militär-med. Journ.*, Sept., 1882.

BECHTEREFF (1) found that severe mechanical injury of one olive in dogs produced constant nystagmus of both eyes, besides other compulsory movements. The eye on the injured side deviates downward and outward, the other eye upward and inward.

CHODIN.

CHARPENTIER (2) presented to the eye two and more points of light 0.2–1.6 *mm.* in diameter, and 0.1–2.5 *mm.* apart, at a distance of 20 *cm.*, and then noted the minimum quantity of light necessary to make them visible. It is inversely proportional to the size of each point, while the number of the points and their distance apart, as long as the latter does not exceed an angle of 35–40 ft., have no effect on the visibility. The results were somewhat different for the ordinary perception of light, where for a retinal surface of the same size or smaller than the fovea centralis the intensity of illumination may be the less the greater the illuminated surface or the sum of the several spots touched by the light.

V. MITTELSTÄDT.

The length of time necessary for the perception of light is very variable even for one and the same person ; only the average of a test is constant. It is shorter for central than for peripheric vision. Practice decreases the time in both cases. The effect of practising a peripheric point of the retina is perceptible over the entire half of that eye and of the other also.

V. MITTELSTÄDT.

TUMM (5) draws the following conclusions from his investigations : 1. The ganglion cervicale supremum exercises independently of the central organs not only a trophic but also a tonic influence upon the nerve fibres going to the iris. 2. The nerve connecting the ganglion with the hypoglossal nerve is not the conductor of reflex irritation from the cranio-spinal centre to the eye. The ganglion has no tonic influence on the nerve fibres issuing from it to the arteries of the head.

HIRSCHMANN.

d.—COLOR-PERCEPTION.

1. AGLAVE. De l' audition des couleurs. *Rec. d' ophth.*, No. 9, Sept., 1882.

2. ENGELMANN. Color and assimilation. Bacterium photometricum. Contribution to the comparative physiology of light- and color-perception. The light- and color-perception of low organisms. *Arch. f. d. ges. Physiol.*, vol. xxix, p. 387.

3. GIRAUD-TEULON. Considérations sur les doctrines des

trois fibres fondamentales d'Young comme base d'une théorie des sensations colorées. *Acad. de méd. Gaz. méd. de Paris*, No. 44. Against Helmholtz.

4. KOLBE. A case of congenital unilateral weakness of red-green perception. *Centralbl. f. prakt. Augenheilk.*, Oct.

5. v. KRIES. The perceptions of the visual organ and their analysis. Leipsic, 1882. Too extensive to review ; to be highly recommended.

6. KROLL. The good results of educating the color sense. *Centralbl. f. prakt. Augenheilk.*, Dec., 1882.

7. MAYERHAUSEN. Contributions to the knowledge of erythropia. *Wiener med. Presse*, No. 42.

8. MAYERHAUSEN. On the association of sounds, especially words with colors. *Klin. Monatsbl. f. Augenheilk.*, p. 383. Criticism of the five cases thus far described and report of a sixth.

9. MAYERHAUSEN. On erythropia. *Centralbl. f. prakt. Augenheilk.*, p. 348.

10. PAMORT. Du contraste chromatique. *Soc. de biol.*, July 23, 1882. Location central.

11. PARINAUD. Du contraste chromatique. Sa raison physiologique. *Soc. de biol.*, No. 28.

12. PEDRONO. De l'audition colorée. *Ann. d'ocul.*, Nov-Dec. New case.

13. SCHNELLER. The question as to the centre of color-perception. *Arch. f. Ophth.*, vol. xxviii, 3. Critical review of the literature and report of a new case.

14. VAN DER WEIJDE. The systems of the color-blind. *Arch. f. Ophth.*, vol. xxviii, 2.

AGLAVE (1) believes there are connecting fibres between the centres of hearing and color-perception.

According to ENGELMANN (2) the movements of low organisms due to light may be produced in three entirely different ways : 1, directly by a change in the inspiration and expiration of the gases, uninfluenced by any sensation ; 2, by a change in the perception of the necessity of breathing, due to a change in the inspiration and expiration of the gases ; 3, by means of a specific process probably corresponding to our perception of light.

According to KROLL (6) 0.3 % of the men in Crefeld and its surroundings are red-green-blind, a fact which he explains by

their occupation, silk-weaving having been practised there for two hundred years, which had developed the color sense of the male population. By educating the color sense in the schools a similar result might be obtained for the population of the whole country; he therefore favors a plan looking to this in all the schools.

According to MAYERHAUSEN (7) erythropia sets in not only after the removal of cataractous lenses, but also when the pupil is dilated by mydriatics before extraction.

B.—ANOMALIES OF REFRACTION AND ACCOMMODATION, LIDS, LACHRYMAL APPARATUS, MUSCLES AND NERVES, ORBIT AND NEIGHBORING CAVITIES, CONJUNCTIVA, CORNEA, SCLERA, AND ANTERIOR CHAMBER.

BY DR. C. HORSTMANN.

1.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

1. DÜRR E. Tabular statement of the refractive condition of the scholars of a Hanoverian school. *Ber. über d. xiv. Vers. d. ophth. Ges.*, p. 166.

2. REICH, M. Myopia in the Trans-caucasian female seminary, the Tiflis military school, the "Zunker" school, and artificial illumination in the classes and dormitories. *Medicinsky Sbornik d. Kaukas. med. Ges.*, 1882, No. 34.

3. ELLINGER. The physiology of writing. A contribution to school-hygiene. *Graefe's Arch. f. Ophth.*, vol. xxviii, p. 233.

4. COHN, H. On white artificial slates for the prevention of myopia. *Centralbl. f. prakt. Augenheilk.*, 1882, p. 334.

5. CHIBRET. Détermination quantitative de la myopie par la keratoscopie a l'aide d'un simple miroir plan. *Ann. d' ocul.*, 1882, vol. lxxxviii, p. 238.

DÜRR (1) examined the refraction of all the scholars of Lyceum II, of Hanover, after a drop of homatropine had been instilled. In the lowest classes there was only 15 % of myopia, but it gradually increased to 94 % in the highest, the average of the whole school being 31.7 %. In the lowest classes 81 % of hypermetropia was found, which gradually diminished until in the highest class it had entirely disappeared.

REICH'S (2) results were as follows : In the lowest class of the school for girls there was 12 % of myopia ; in the highest, 53 %, the average being 33 %. The development of myopia was due to the poor illumination in the lower classes. In the three classes of the infantry-school there were 52 myopes among 292 scholars. The ratio of the square surface of window to that of the floor was 1:12 and 1:16. The illumination at night was very poor. The majority of the myopes were Armenians. HIRSCHMANN.

ELLINGER (3) opposes the practice of inclining the copy-book to the right, as it favors the development of myopia.

COHN (4) recommends the introduction of slates of white stone instead of the customary ones, as the former produce no reflection, and black writing on a white background can be read at a greater distance than the reverse.

CHIBRET (5) determines myopia by the movement of the shadows of the retina, which takes place when light is thrown into the eye with a mirror and the latter rotated slightly.

MARCKWORT.

II.—LIDS AND SURROUNDINGS OF THE EYE.

1. TAMAMCHEFF. Another contribution to the pathology and treatment of affections of the margin of the lid, especially trichiasis and distichiasis. *Ber. über d. xiv. Vers. d. ophth. Ges.*, p. 178.

2. GALEZOWSKI. Chancre des paupières du globe oculaire. *Rec. d' ophth.*, Oct., 1882.

3. SNELL. Hard chancre of inner canthus. *The Lancet*, 1882, No. 25.

4. BLANCH, AGUILAR. Mélano-sarcome de la paupière. *Rec. d' ophth.*, Oct., 1882.

5. CHIPOT. Œdème malin des paupières. *Soc. de chir.* Séance de Janv., 1882.

6. WALDHAUER. L'opération du trichiasis. *Rev. génér. d' ophth.*, vol. i, p. 513.

7. CHODIN, A. W. On Watson-Junge's operation for entropium of the upper lid. *Sitzungs-protocoll d. Kiowschen ärztl. Ver.*, Nov., 1882.

8. CARRÉ. Ectropium cicatriciel de la paupière inferieure operation avec greffe dermoepidermique. *Gaz. d' ophth.*, No. 12, 1882.

9. KRÜKOW, A. Remark on blepharoplasty. *Medicinskoje Obosrenye*, 1882, No. 10.

10. TAYLOR. On the transplantation of skin *en masse* in the treatment of ectropium and other deformities of the eyelids. *Brit. Med. Journ.*, Oct. 7, 1882, p. 672.

11. BORTHEN-LYDER. Epicanthus. *Rec. d' ophth.*, Oct., 1882.

12. SNELL. The elastic ligature in some cases of symblepharon. *Ophth. Rev.*, Dec., 1882, p. 399.

13. BENSON. On the treatment of partial trichiasis by electrolysis. *Brit. Med. Journ.*, Dec. 16, 1882, p. 1203.

According to TAMAMCHEFF (1) purulent inflammation of the tarsal glands and their surroundings may produce trichiasis and distichiasis. These affections may also be due to the closure of some or all the glands of the lids. At the same time there is always chronic tarsitis. In order to remove this condition he makes a longitudinal incision at the edge of the tarsus, 4-6 mm. deep, and parallel to the orifices of the glands. Then he cauterizes the exposed portion of the lid with a sharp stick of nitrate of silver. After the lapse of 48 hours the eschar with the irregular lashes, falls off. There is never a relapse.

GALEZOWSKI (2) reports four cases of specific ulcer of the lids. SNELL (3) one in which the ulcer was situated at the inner canthus.

BLANCH (4) describes a tumor of the lids; excision. It proved to be a melano-sarcoma.

MARCKWORT.

CHIPOT (5) cured malignant œdema of the lids by subcutaneous injection of iodine, iodine bandage, and suturing the lids. The sutures were applied in order to prevent entropium.

MARCKWORT.

BENSON (13) cured partial trichiasis by galvano-cautery. He introduces a needle at the positive pole into the follicle, while he applies the other pole to the outer canthus. He treated 120 cases with good results.

FITZGERALD.

CHODIN (7) recommends Watson's method as modified by Junge and himself for entropium of the upper lid and trichiasis without marked curvature of the tarsus. The operation consists in pushing the lashes upward, after detaching them by an inter-marginal incision, and transplanting into this space a bridge of skin

detached from the tarsus but not abscised at its ends. This piece of skin may slough or be destroyed entirely (1 case in 7).

HIRSCHMANN.

CARRÉ (8) transplanted two flaps 18 mm. broad and 27 mm. long into the defect formed by detaching the scars produced by burn; they became attached.

V. MITTELSTÄDT.

After reviewing the history of blepharoplasty KRÜKOW (9) describes a case in which he operated according to Wolfe's method with good results. He then recommends Mirault's method of operation for cicatricial ectropium, and cites 19 cases besides 4 of his own in which the result was favorable. The operation consists in detaching and then reducing the ectropionized lid, freshening the edges of both lids, and uniting them with sutures. The lids are not separated until a longer time has elapsed.

HIRSCHMANN.

TAYLOR (10) transplanted flaps without a pedicle in a number of cases. The first was a defect in the upper lid, due to too extensive excision of skin in an operation for ptosis. The second case was one of very extensive symblepharon.

BORTHEN-LYDER (11) describes two cases of epicanthus which were operated according to Ammon.

MARCKWORT.

SNELL (12) states that in some cases of symblepharon he found the elastic ligature of service. He passes a needle armed with a fine elastic thread through the band uniting the lid to the globe, and ties the ligature firmly. In from two to four days the ligature cuts itself out. The method was not always successful.

FERGUSON.

III.—LACHRYMAL APPARATUS.

1. DEHENNE. Note sur la therapeutique des affections des voies lacrymales. *Rev. d' ocul. du sud-ouest*, vol. iii, p. 217.

2. CORNWALL. A case of obstruction of the inferior canaliculus of the eye by dacryoliths. *Amer. Med. Journ.*, July, 1882, p. 108.

3. DAMALIX. Des larmes de sang. *Arch. d' ophthalm.*, vol. ii, 5, p. 429.

DEHENNE (1) is opposed to the use of powerful substances in treating strictures of the nasal duct. He introduces Bowman's probe No. 2 a few times, and syringes the canal with ordinary water.

CORNWALL (2) observed a closure of the lower lachrymal duct by a dacryolith.

DAMALIX (3) has compiled some older observations of bloody tears and adds one by himself at Panas' clinic. In a nervous young woman suffering from hysteria bloody tears were discharged at the same time of day at which formerly there had been hemoptoë (though the author never saw this himself [REV.]. It seems to be a rare symptom of hysteria. V. MITTLESTÄDT.

IV.—MUSCLES AND NERVES.

1. HOCK. The significance of the oblique position of the head. *Wiener med. Presse*, 1882.

2. BOUCHAND. Nystagmus horizontal unilatéral. *Fourn. des sciences de Lille*, Nov. 5, 1882.

HOCK (1) calls attention to the influence of an oblique position of the head on the development of strabismus.

BOUCHAND (2) reports two cases of unilateral horizontal nystagmus, in one of which the autopsy showed atrophy of the left abducens and oculomotor nerves. MARCKWORT.

1. WARNER. Ophthalmoplegia externa. *Brit. Med Fourn.*, Oct. 25, 1882, p. 843.

2. SNELL. Hysterical ptosis. *Ophth. Rev.*, Dec. 1882, p. 404.

3. LUNDY. Important cases. *Rep. of the Mich. Free Eye and Ear Infirmary*, 1882.

WARNER (1) describes the case of a woman, æt. twenty-five, who was the subject of Graves' disease, and whose eyes were nearly immobile. This condition had existed for five months. Limitation of the movements was not equal in both eyes, and was greater in the horizontal than in the vertical direction. There were double ptosis and bilateral paresis of the seventh and fifth pairs of nerves. There was also well-marked tremor of the legs. No evidence of syphilis. Under treatment the goitre diminished and the general condition improved, but the ophthalmoplegia remained. The inequality of the paralysis in the two eyes seemed to support the idea of an independent nerve centre for the movements of each eye. FITZGERALD.

SNELL (2) observed a case of hysterical ptosis in a girl about twelve years old, who had been menstruating for six months rather freely. She made a good recovery. FERGUSON.

In treating a paralyzed internal rectus muscle, LUNDY (3) seizes the ocular conjunctiva over the insertion of the muscle, and rotates the eye in various directions, especially outward and inward, for about a minute. This must be repeated after two or three days. The treatment was successful beyond a doubt.

S. M. BURNETT.

1. BADAL. De l'élargissement du nerf nasal externe contre les douleurs ciliaires. *Ann. d' ocul.*, 1882, vol. lxxxviii, p. 241.

2. BLUM. Arrachement du nerf sous-orbitaire pour une névralgie rebelle. *Soc. de chir.*, séance du 29 Nov. et 6 Dec., 1882, *Gaz. d' ophth.*, 1883, No. 1.

3. WEINBERG. Troubles oculaires d'origine nerveuse produits par causes extra-orbitaires. *Rec. d' ophth.*, Nov., 1882.

BADAL (1) stretched the infra-orbital nerve, and excised a portion of it in three patients with good results. The affections thus treated were neuralgia of the trigeminus, chronic cyclitis combined with phthisis of the globe, and pains in chronic glaucoma (amaurosis). In the first case the infra-orbital nerve had previously been stretched with moderate success; in the second, peritomy had failed; and in the third, a broad iridectomy had proved of no avail.

BLUM (2) hit upon this method by accident, as the supra-orbital nerve tore while being stretched, the indication being neuralgia lasting for fifteen years.

V. MITTELSTÄDT.

WEINBERG (3) discusses the ophthalmic zone, and believes that the cause must be sought in an irritation of the nerves of the skin; by reflex action this produces dilatation of the blood-vessels of the eye. The entrance of small particles of diseased skin into the conjunctival sac and the cornea is sufficient to produce severe affections like keratitis, iritis, etc. (? !—REV.). MARCKWORT.

V.—ORBIT AND NEIGHBORING CAVITIES.

1. PANAS. Diagnostic des tumeurs de l'orbite. *Gaz. d' ophth.*, 1883, No. 3.

2. SCHWENDT. On orbital phlegmone and subsequent blindness. *Inaug. Diss.*, Basel, 1882.

3. SNELL. Orbital periostitis; exophthalmus; atrophy of optic disc. *Ophth. Rev.*, Dec., 1882, p. 402.

4. LEDIARD. Large ivory exostosis. *The Lancet*, No. 25.

5. GRIFFITH. Hydatid of orbit. *Brit. Med. Jour.*, Dec., 1882, p. 1295.
6. MULES. Hydatid tumor of orbit. *The Lancet*, No. 25.
7. SNELL. Fracture of orbital plate of superior maxillary bone. *Ophth. Rev.*, Dec., 1882, p. 401.
8. SNELL. Hemorrhage into orbit; exophthalmus; atrophy of disc. *Ophth. Rev.*, Dec., 1882, p. 402.
9. JONES. Fractures of orbit. *Brit. Med. Jour.*, Oct. 25, 1882, p. 844.
10. GLASCOTT. Traumatic aneurism of the orbit. *Brit. Med. Jour.*, Nov., 1882, p. 1042.
11. GLASCOTT. Spontaneous cure of arterio-venous aneurism of the orbit. *Brit. Med. Jour.*, Nov. 25, 1882.
12. LLOYD, W. A case of intra-orbital aneurism following fracture of the base of the skull and meningitis. *The Lancet*, Nov. 11, 1882, No. 19, p. 799.
13. GALLENGA. Contribuzione allo studio dei tumori vascolari dell' orbita. *Giorn. d. R. Acad. di Med. di Torino*, 1882, Nos. 5 and 6.
14. PRIDEAUX. Penetrating wound of the orbit involving the brain. *The Lancet*, Nov. 18, 1882, No. 20, p. 846.
15. THOMSON. On two cases of abscess of the antrum. *Dublin Med. Jour.*, July, 1882, p. 16.
16. BENSON. Sarcoma of right antrum with intense optic neuritis and proptosis. *Brit. Med. Jour.*, Dec. 2, 1882, p. 1082.
17. SNELL. Eyeball transfixed by a knife-blade. *Ophth. Rev.*, Dec., 1882, p. 399.
18. PARINAUD. Tetanus consécutif a une plaie pénétrante de la cavité orbitaire. *Gaz. méd. de Paris*, 1882, No. 50.

According to PANAS (1) the point to be considered in affections of the orbit is, whether the tumor originated in the orbit or in the neighboring cavities. If it sprang from the outer wall, its origin is in the orbit. Then it must be determined whether the wall or a part of the contents of the orbit have become involved. The kind, prognosis, and treatment of the tumor depend on the special and general symptoms. In doubtful cases, which are not rare, surgical treatment should not be resorted to.

V. MITTELSTÄDT.

SCHWENDT (2) reports a case of phlegmone or abscess of the orbit, which caused atrophy of both optic nerves.

SNELL (3) reports a case in which, after severe toothache, the patient's cheek became much swollen, and the eyeball protruded. An incision along the lower margin of the orbit gave exit to a quantity of pus. The globe subsequently went back to its place, but the nerve was much atrophied. V—perception of light.

FERGUSON.

LEDIARD (4) observed a large ivory exostosis which sprang from the orbital wall.

GRIFFITH (5) and MULES (6) report cases of serous cysts which had been removed from the orbit. There had been great protrusion of the globe, with swelling of the optic papilla, and V was very much reduced. The globe subsequently returned to its place, and vision improved considerably.

FITZGERALD.

SNELL (7) reports a case in which a fracture of the orbital plate of the superior maxillary bone was caused by a fall on the roadside. The line of fracture could be distinctly felt running vertically from the edge of the orbit to the infra-orbital fissure. He also reports a case of hemorrhage into the orbit following a blow over the eyebrow. There was exophthalmus, which slowly subsided; subsequently, optic atrophy; V reduced to perception of light.

FERGUSON.

JONES (9) describes a case in which both eyelids were lacerated by the strap of a carding machine. Right eyeball was destroyed, and a piece of bone was protruding through the upper lid. Eyelids were stitched; remains of eyeball removed, and a piece of bone dissected out. The latter proved to be a portion of the orbital plate of the frontal bone, including the orbital notch, and measured $1\frac{1}{4}$ inches. The man quite recovered.

FITZGERALD.

GLASCOTT (10) observed a case of traumatic aneurism of the orbit producing exophthalmus. Patient derived great benefit from intermittent compression of the left carotid artery. The exophthalmus was reduced, and there was a cessation of whizzing in the head, and the infra-orbital bruit de soufflé disappeared. He also (11) observed a case of aneurism of the orbit, which had existed for some time, which was cured spontaneously during an attack of phlegmonous inflammation of the face and head.

FITZGERALD.

LLOYD (12) observed a case of intra-orbital aneurism in a woman of twenty-nine, who had been thrown from a wagon and had sus-

tained a fracture of the base of the skull. Meningitis ensued, and in about six weeks the left eye began to become prominent and sight to fail. Ligation of the common carotid artery checked the growth of the aneurism for a time, but six months later, the eye being still prominent, it was removed on account of the pain; V had been lost.

GALLENGA (13) describes a curious case of unilateral exophthalmus observed at Raymond's clinic. The disease had begun with a marked swelling of the lids of the left eye about six years ago without any assignable cause. A year later, the globe, whose tension had increased a little, became slightly prominent, which gradually increased until finally it became at times a perfect hernia of the globe, the plane of the aperture of the lids falling behind the equator of the eye. The eye generally protrudes and is turned downward and outward, but covered by the lid. Compression forces the globe back as upon a soft cushion; this is still more the case when the patient lies on his back and the carotid is compressed. When the pressure ceases, the globe springs back beyond the margin of the lid and then gradually returns to its former position. This dislocation of the globe also easily takes place when the head is bent forward and the patient breathes out. V was gradually lost, and there is now atrophy of the optic nerve. The diagnosis of cavernous angioma was made on account of the slow development, the absence of pulsation, the presence of a faint blowing sound, and especially on account of the power to replace the dislocated globe.

DANTONE.

According to an observation of PRIDEAUX (14), a child received a penetrating wound of the orbit which involved the brain. It died on the fourth day. There was an extensive abscess in the right anterior cerebral lobe.

FERGUSON.

THOMSON (15) reports cases of abscess in Highmore's antrum. BENSON (16) describes a sarcoma commencing in the right antrum, which had produced intense optic neuritis and proptosis.

FITZGERALD.

SNELL (17) reports a case in which a knife-blade transfixed an eye from the outer angle of the orbit. The globe retained its appearance, but all vision was lost.

FERGUSON.

PARINAUD (18) observed a case of injury produced by a splinter, which had entered the orbit in the region of the lachrymal gland, and was extracted half an hour later. Symble-

pharon with partial lagophthalmus developed at the point of injury. Two weeks later blepharospasm, contraction of the external rectus muscle, and trismus set in, while the eye inflamed. Convulsions and opisthotonus soon followed. The patient did not appear again; probably he died. v. MITTELSTÄDT.

1. Morbus Basedowii. *Brit. Med. Journ.*, Oct. 28, 1882; and *Centralbl. f. pract. Augenheilk.*, 1882, p. 564.

2. PRIBRAUX. Reconvalence in a severe case of Graves' disease. *Wiener med. Presse*, 1882, No. 44; *Wiener med. Wochenschr.*, 1882, No. 44.

In a person twenty-five years old (1) suffering from Basedow's disease, both eyes were almost immovable, besides ptosis and paralysis of both fifth and seventh nerves. No syphilis. The goitre disappeared under treatment, but the ocular symptoms remained.

VI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

1. SATTler, H. Further investigations on trachoma and remarks on the origin of blennorrhœa of the new-born and its treatment. *Ber. über d. xiv. Versamml., d. ophth. Gesellsch. zu Heidelberg*, 1882, p. 45.

2. LANDESBURG, M. Blennorrhœa of the new-born. *Med. Bull.*, 1882, vol. iii, No. 2.

3. VALK, F. A peculiar case of trachoma. *Med. Rec.*, Aug. 26, 1882.

4. STOCQUART. Cas d'auto-inoculation vaccinale ayant donné lieu à une ophthalmie diphthéro-purulente.

5. BADER. The treatment of gonorrhœal ophthalmia. *The Lancet*, Oct. 14, 1882, p. 345.

6. SIMI. Sulla ottalmia purulenta provocata come un mezzo terapeutico. *Boll. d' ocul.*, vol. v, 3, Nov., 1882.

7. MAFFIORETTI. Contribuzione alla cura dell' oftalmia purulenta e blennorragica. Roma, 1882.

8. SÉDAN. Au sujet de la cure possible de la conjonctivite granuleuse chronique par l' inoculation purulente. *Rev. a' ocul. du sud-ouest*, 1882, vol. iii, 9.

9. DIANOUX. De l' ophthalmie purulente provoquée comme moyen thérapeutique. *Le progr. méd.*, 1882, Nos. 41 and 43.

10. MOURA-BRAZIL. Traitement de la conjonctivite granuleuse aiguë et chronique par l' abrus precatorius, Jequirity. *Ann. d' ocul.*, Nov. and Dec., 1882.

11. MOYNE. L' oftalmia purulenta artificiale prodotta dal Jequirity. *Boll. d' ocul.*, vol. v, 3, Nov., 1882.

12. SIMI. Jequirity. *Boll. d' ocul.*, vol. v, 4, Dec., 1882.

13. CORDOSA. Du Jequirity dans le traitement des granulations de la conjonctive. *Gaz. med. de Paris*, 1882, No. 51.

14. TERRIER. Rapport sur un travail de Mr. Cordosa. Du Jequirity contre les granulations conjonctivales. *Soc. de chirurgie*. séance du 13 Dec., 1882.

15. SNELL. Boracic acid. *Ophth. Rev.*, vol. i., Oct., 1882, p. 346.

16. FERGUSON. Boracic acid in purulent conjunctivitis. *Ophth. Rev.*, vol. i, Nov., 1882, p. 363.

17. KAZANZOW, J. The importance of iodoform in ocular affections. *Wratsch*, 1882, No. 42.

18. MANOLESCU, N. L' iodoforme dans la chirurgie oculaire. *Arch. d' ophth.*, vol. ii, No. 6.

19. SNELL. Iodoform. *Ophth. Rev.*, vol. i, Oct., 1882, p. 345.

20. LANDOLT. Lepus peroxyde d' hydrogène dans la thérapeutique oculaire. *Arch. d' ophth.*

21. BENSON. Lupus of the conjunctiva. *Brit. Med. Journ.*, Dec. 23, 1882, p. 1256.

22. FALCHI. Granuloma e tubercolosi della congiuntiva. *Gazz. d' ospitali*, No 95; *Ottalm.*, 1882.

23. SBORDONE. Un caso di ulcera congiuntivale sifilitica primitiva. *Il movimento medico-chirurgico*, vol. xiv, Nos. 3 and 4, 1882.

24. ROBINEAU. Quelques variétés de tumeurs malignes de la conjonctive. *Thèse de Paris*, 1882.

SATTler (1) has repeated his already published investigations on the development of trachoma through the agency of micrococci with special reference to Koch's method of breeding them. The culture and inoculation were completely successful, so that these results corroborate the former ones in every respect. As regards the morphology of the micro-organisms, they never assume the shape of chains or form large zoöglœa masses, but are either in small groups, single or in pairs, though when fully developed the separate elements never come into immediate contact, but are always separated by a small interstice. One of the principal characteris-

tics is the extensive subdivision of the trachomanodule. The trachoma-micrococci were bred through several generations. Sattler inoculated the human conjunctiva with micrococci of the third generation, which were purely bred. An eruption of trachoma-granules followed, taking a mild chronic course. Only the micrococci of trachoma produce similar granules on the conjunctiva, while other micro-organisms introduced and rubbed into the conjunctival sac produced no changes.

Sattler also introduced lochial secretion into the eyes of an infant. After forty hours blennorrhœa developed. This proves by direct experiment that blennorrhœa is due to infection with lochial secretion, and that the conjunctival sac of the new-born is the best soil for breeding the micrococci of blennorrhœa, when in a mixture of various kinds of bacteria. Probably the micrococcus of blennorrhœa floats about in the air. It enters the vagina, there undergoes a sort of preliminary culture, and thus acquires the peculiar power of producing, under certain favorable conditions, a blennorrhœic inflammation in the male urethra and the conjunctiva. The most rational form of treatment would therefore seem to be the antiseptic.

LANDESBURG (2) discusses blennorrhœa of the new-born. It is an infectious disease, and is generally produced by the introduction of abnormal vaginal secretion into the eye. Therefore the vagina of every woman in a normal condition must be abnormal when the head of the child passes through it. The examining finger as well as the whole vagina must be carefully disinfected before each examination, especially when performed by the midwife. The strictest precaution must be taken that the mother does not infect the child.

VALK (3) saw a case of trachoma in which the granulations were confined to the upper lid. They were of a light flesh color, perfectly dry, without any blood-vessels, of cartilaginous hardness, and formed cubes of one cubic *mm.* firmly pressed against each other. They resisted every kind of treatment, and were finally pressed out with a sharp fixation-forceps. BURNETT.

Fifty-six days after the development of a vaccine pustule on his own arm STOCQUART (4) observed purulent conjunctivitis in the left eye, followed by false diphtheritic membranes on the conjunctiva. Cured by antiseptic treatment. Probably some of the vaccine had got into the eye, as with the exception of the arm and eye no other part of the body was affected. v. MITTELSTÄDT.

In three cases of gonorrhoeic ophthalmia, BADER (5) obtained good results by the use of a salve consisting of one grain of red precipitate and one fifth of a grain of atropine, to an ounce of vaseline.

FERGUSON.

SIMI (6) favors the inoculation of blennorrhoeic pus in cases of pannus. In view of the excellent result frequently obtained, so powerful a remedy should not be simply discarded. The danger to the cornea from blennorrhoea seems the less to the author, the denser the pannus which protects the healthy parts of the cornea like a coat of mail at the height of the inflammation. If jequirity should meet expectations, he would of course prefer it, as the intensity of the inflammation could be regulated.

DANTONE.

DIANOUX (9) reports two cases of granular pannus and one of total sclerosis of the cornea which were cured by the inoculation of blennorrhoeic pus. In the latter case improvement was very moderate. Dianoux hopes to produce a milder form of blennorrhoea by inoculation with Neisser's cultivated micrococci, and believes that obstinate cases of trachoma with intact cornea could be cured by such an inoculation.

V. MITTELSTÄDT.

MOURA-BRAZIL (10) experimented with jequirity on rabbits, and found that the method as employed in Brazil is too dangerous, as it produces suppuration which cannot be controlled. In order to mitigate its action and properly dose it, he experimented with several preparations, and finally decided on a greenish extract for man (0.2 : 10.0), which he brushed on the granulations. A yellow membrane formed, which was removed next day ; the granulations were then again brushed and the membrane again removed. This treatment was continued for 3-5 weeks, when the granulations had become much smaller or had entirely disappeared.

MARCKWORT.

MOYNE (11) was the first in Italy to make experiments with jequirity. For three days applications were made with an infusion of jequirity (32 pulverized beans to 1,000 grms. of water), to the eyes of three children suffering from trachoma, who had been treated for four months with nitrate of silver and tannine without much success. In one case there was considerable reaction ; the lids swelled, the cornea became slightly hazy, and on the fifth day purulent secretion set in. This state of affairs soon ended, and on the twentieth day all the symptoms as well as the trachoma had disappeared. In the other two children the inflam-

mation was much milder, nevertheless the granulations soon disappeared. In all three cases the cornea was not pannous.

DANTONE.

SIMI (12) tried jequirity, according to Wecker's method, in two cases of trachoma and pannus. Inflammation set in as expected, and culminated on the fourth day; on the twelfth day it came to an end. As regards the result, no change could be seen in one patient, one of whose eyes was staphylomatous and the other partly so, either in the trachoma, which had existed for four years, or in the pannus. In the other patient the granulations had become smaller, while the pannus had not perceptibly diminished, though the patient declared he could see better.

DANTONE.

TERRIER (14) used jequirity in a case of trachoma; purulent conjunctivitis ensued; the granulations were not affected.

MARCKWORT.

SNELL (15) obtained good results with boracic acid in purulent, catarrhal, and some kinds of phlyctænular ophthalmia. According to the intensity of the inflammation he uses a stronger or weaker solution (10-25 grains to the ounce).

FERGUSON.

FERGUSON (16) recommends boracic acid in acute catarrhal and purulent ophthalmia. He uses it thus: After carefully ectropionizing the lid, boracic acid, in the form of an impalpable powder, is dusted upon and then washed off. If the action is too severe he employs a solution.

FERGUSON.

KAZANZOW (17) like Deutschmann, praises iodoform in purulent keratitis, but saw no benefit, and sometimes even harm, in catarrhal conjunctivitis, trachoma, phlyctænular conjunctivitis, and blennorrhœa. In two minutely-described cases of extraction complicated with loss of vitreous, healing progressed without reaction under the influence of iodoform in form of a powder, and serviceable sight was obtained.

HIRSCHMANN.

MANOLESCU (18) has used iodoform for two years in form of a powder and salve in affections of the cornea, and as an antiseptic in various operations. In one case of gonorrhœic ophthalmia with a corneal ulcer he obtained a good result, also in complicated extraction. In a few cases iodoform checked an incipient sloughing of the cornea; once panophthalmitis resulted.

V. MITTELSTÄDT.

In one case of purulent conjunctivitis published by SNELL (19) iodoform failed, but proved beneficial in some cases of trachomatous pannus.

FITZGERALD.

LANDOLT (20) reports in detail on the production of hydrogen dioxide, its physical and chemical properties, its physiological action and its importance as an antiseptic. It acts as such by setting free oxygen in a nascent state, directly destroying the bacteria, and mechanically disintegrating the pathological products and thus aiding their removal. He recommends it diluted with water, especially in purulent conjunctivitis, old corneal ulcers, and purulent affections of the lachrymal apparatus, in all of which he obtained good results. It produces no pain and has no injurious influence on the eye, provided the preparation be pure, for controlling which he gives the necessary reactions. v. MITTELSTÄDT.

BENSON (21) observed lupus of the conjunctiva in a young girl. FITZGERALD.

FALCHI (22) describes an extensive ulcer of the left lower lid of a child seven years old, which proved to be tuberculous when examined with the microscope. The author compares the clinical and anatomical condition with that of a neoplasm of connective tissue observed in another person, in which the tuberculous nodules were not clearly developed, so that it was set down as a simple granuloma. DANTONE.

1. LUCANUS, C. Contributions to the pathology and therapeutics of the serpent corneal ulcer. *Inaug. Dissert.*, Marburg, 1882.

2. SIMI. Il fuoco nelle malattie della cornea. *Boll. d' ocul.*, vol. v, No. 4, Dec. 4, 1882.

3. DELORD. Cautérisation ignee de la cornée. *Thèse de Montpellier*, 1882.

4. GUAITA. Da medicatura antisettica della cheratite ulcerosa. *Annal. di ottalm.*, vol. xi, 5.

5. WHITE, B. Peritomy in acute vascular keratitis. *Brit. Med. Journ.*, Nov. 4, 1882, p. 890.

6. CHIBRET. De l' emploi de la syndectomie dans la cure de la keratite pustuleuse a rechutes. *Rev. d' ocul. du sud-ouest*, vol. iii, No. 11, p. 235.

7. DAUDRIÉ. Sur un cas de k ratite syphilitique. *Rev. d' ocul. du sud-ouest*, vol. iii, No. 12, p. 295.

8. BULL, O. B. Forekommer keratites neuroparalytica hos Spedalske. *Norsk Magazin for Slegevidenskaben*, vol. xii, No. 10, pp. 740-755, Christiania, 1882.

9. LIPPMANN, BERLINER. Case of hypopyon-keratitis due to fungi. *Inaug. Diss.*, Berlin, 1882.

10. MAGNUS, H. A splinter of glass which had remained two years and three months in the cornea of the left eye. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 396.

11. FANO. Collyre au laudanum dans les hernies de l'iris consécutives aux perforations ulcéreuses de la cornée. *Journ. d'ocul.*, No. 13, p. 183, July, 1882.

12. KLEIN. Staphyloma. *Eulenburg's Real-Encycl. f. d. ges. Heilk.*, vol. xiii, p. 46.

Based on his observations of serpent ulcer, LUCANUS (1) concludes that the glowing iron cannot check its progress either with certainty or even probability. It may even act injuriously, either directly by thinning the cornea too much and thereby tending to the development of a staphyloma, or indirectly, as the more efficient splitting (cross-incision) is then too late.

SIMI (2) believes hypopyon-keratitis to be due to parasites, and recommends the ferrum candens as one of the most efficient means of preventing its spread. In a case which he accurately describes, he used a steel pen brought to a white heat in a spirit-lamp and held in an ordinary wooden pen-holder. After burning it twice in six days, an extensive ulcer healed in ten days, which had occupied one fourth of the cornea. The irritation was not increased by the cauterizations. DANTONE.

GUAITA (4) treated fifty-two cases of corneal ulcers under strict antiseptic precautions and obtained very good results. He used the dry salicylic bandage (5 % gauze and 4 % cotton, and over it gutta-percha paper) under a spray of 6 % boracic acid. In a few cases carbolic acid and thymol were first used, but soon abandoned, as they produced too much irritation. In the crater-shaped ulcers the effect was rapid and sure; somewhat slower in the circular ulcers. The serpent ulcer could also be controlled in its early stage by the antiseptic treatment alone; when far advanced, Saemisch's incision was added. DANTONE.

WHITE (5) performed peritomy of the cornea combined with Saemisch's operation in a case of corneal ulcer in which all other means had failed. The result was very satisfactory as only a small leucoma remained a few months later.

FITZGERALD.

BULL (8) opposes in his paper the theory defended by Böckmann (*vide* his inaugural dissertation "Om den ved trigeminus-anæsthesier forekommende Hornhindelidelses Vasen op Aarsager"), according to which the corneal affections occurring in paralysis of the fifth nerve are not due to drying up and reactive inflammation. After demonstrating that Böckmann is hardly justified by his experiments in concluding that the so-called xerotic theory (Feuer) is the only correct one, he shows that theoretically it can be still less maintained.

SCHIÖTZ.

LIPPMANN, BERLINER (9) reports a case of hypopyon-keratitis, due to fungi. A portion of the cornea became necrosed.

MAGNUS (10) extracted a bit of glass from the cornea of the left eye of a lady, which had been there for two years and three months without causing any marked irritation.

FANO (11) treats hernias of the iris due to corneal ulcers by dropping a few drops of tinct. opii crocata (one to one part of water) every day upon them. Atropine and the other general remedies are used at the same time.

MARCKWORT.

1. UHTHOFF. Some pathological changes in scleritis, episcleritis, and vernal catarrh. *Ber. über d. xiv. Vers. d' ophth. Ges.*, p. 63.

In episcleritis UHTHOFF found the blood-vessels considerably enlarged, their immediate surroundings infiltrated with round cells, as also the subepithelial tissue of the conjunctiva, while in a few places there were exudations interspersed with numerous cells. The lymph-vessels were considerably distended, and in one place had formed a system of lacunæ. Sometimes they had no endothelium.

In vernal catarrh the proliferations of the limbus consist of a thick epithelial layer extending downward like a peg, as in cancer, though there was no stratification. Immediately beneath the epithelial layer there is a bright homogeneous zone, composed partly of spherical, partly of oblong homogeneous masses, probably coagulated albuminous liquid. The connective tissue of the conjunctiva was but slightly altered.

C.—IRIS AND UVEAL TRACT, GLAUCOMA, SYMPATHETIC OPHTHALMIA, REFRACTIVE MEDIA (LENS AND VITREOUS BODY), RETINA AND FUNCTIONAL DISTURBANCES, OPTIC NERVE, INJURIES, FOREIGN BODIES (PARASITES), OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

By DR. A. NIEDEN.

I. a.—IRIS.

1. BENSON. Very large iritic membrane. *Brit. Med. Journ.*, Dec. 2, 1882, p. 1054.
2. FANO. Iritis syphilitique à formes hémorrhagiques. *Journ d' ocul.*, Feb., 1882.
3. MASSE, E. Pathogénie des kystes de l'iris. Leur production artificielle par des greffes de lambeaux de cornée sur la membrane irienne. *Acad. des scienc.*, Jan. 15, 1883.
4. OWEN. Tumor of the iris. *Brit. Med. Journ.*, Dec. 9, 1882, p. 1156.
5. RAMPOLDI. Le iniezioni ipodermiche di calomelano a proposito di un caso di irite sifilitica gommosa. *Ann. univers. di med.*, 1882, vol. cclxi.
6. STURGIS, F. R. Two cases of gummous iritis. *Sel. Quart. of Med. and Surg.*, No. 5.
7. TALKO, J. Case of persistent pupillary membrane in both eyes. *Zeh. klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 346.
8. ZEHENDER. On peripheric prolapse of iris. *Sitzungsber. d. Heidelb-opthth. Ges.*, 1883, p. 110.

BENSON (1) reports a case in which, after an extraction of a traumatic cataract, the iris was almost completely altered into a layer of dense-looking white fibrous tissue, a few shreds of iris remaining at the lower and outer side. Through two small openings the fundus could be seen, showing extensive choroiditis. V=fingers at 3'.
FITZGERALD.

STURGIS (6) reports two cases of syphilitic affection, in one of which there were cyclitis and choroiditis, while in the other the choroid was not affected.

RAMPOLDI (5) recommends subcutaneous injections of calomel (0.10 a dose), which for years have been practised by Italian

physicians in all affections of the eye due to syphilis, as well as in obstinate cases of keratitis and iritis not of specific origin. The result is remarkable, and frequently perceptible after twenty-four to forty-eight hours. In a case reported, two injections, combined with the internal use of calomel, sufficed to check the course of the disease in the eye. The first injection Rampoldi gives at the temple, but warns against entering the needle very deeply, in order to prevent an abscess or periostitis; for the second the arm may be chosen.

DANTONE.

MASSE (3) continued his experiments on rabbits for the artificial production of cysts of the iris. He introduced a small piece of cornea abscised with Beer's knife into the anterior chamber, where it attached itself to the iris and became opaque and vascular, the blood-vessels coming from the iris; genuine cysts with transparent walls then developed, which undoubtedly grew out of the corneal tissue transplanted upon the iris.

MARCKWORT.

OWEN (4) showed a case of a small pedunculated vascular tumor, about the size of a large pin-head, situated near the free border of the iris. It had increased very little during a period of six months. Nature uncertain.

FITZGERALD.

ZEHENDER (8) discusses the peripheric prolapse of iris, which frequently produces dangerous inflammation at a very late period, and ascribes this to the severe traction of the ciliary body (Swanzy). In order to prevent this Zehender has practised a special method of incising the edges of the iris with great success. In the discussion which ensued, Arlt, Leber, and others referred this destructive process to mycotic infection, sometimes resulting in the rapid destruction of the eye.

TALKO (7) discusses a case of bilateral persistent pupillary membrane, which scarcely differs at all from similar cases.

I. b.—CHOROID AND CILIARY BODY.

1. FUCHS, E. Congenital anomaly in the choroid. *Arch. f. Augenheilk.*, vol. xii, p. 1; *These ARCH.*, vol. xii, 1, p. 37.

2. HIRSCHBERG, J. Case of binocular metastatic cancer of the choroid. *Sitzungsber. d' Berl. med. Ges.*, Nov. 9, 1882; *C. f. A.*, vol. vi, p. 376.

3. HIRSCHBERG, J. The prognosis of sarcoma of the choroid. *Virchow's Arch.*, xc, pp. 1-75.

4. HOENE, J. Recherches microscopiques sur les ossifications chorioidiennes. *Rec. d'ophth.*, Dec., 1882.

5. HOSCH (Basel). Un cas de tuberculose de la choroïde, inoculée dans la chambre antérieure de lapins. *Arch. d'ophth.*, vol. ii, No. 6.

6. KAZANZOW, J. N. Case of sarcoma of the choroid. Read before the Society of Physicians of Jaroslav. *Wratsch*, 1882, No. 52.

HOSCH (5) experimented upon the eyes of rabbits in regard to the inoculation of tuberculous masses of the choroid. He enucleated the right eye of a young man of seventeen without any hereditary taint, which gradually had lost its sight after previous nutritive disturbances, while a tumor gradually developed to the inward of the cornea, whose nature could not be definitely determined. From this tumor a fistula extended inward to a cavity occupying the greatest part of the interior of the eye, the walls of which consisted of a caseous mass, which included the deeper layers of the sclera and most of the choroid, while only the anterior and a small part of the temporal section of the eye was comparatively healthy. This caseous mass was introduced into the anterior chamber of three rabbits, where it produced an eruption of tubercles on the iris after the lapse of twenty-two to thirty-nine days. These tubercles when used for inoculation produced the same result after twenty-three days. Unfortunately the experiments could not be continued, as all the animals perished by an accident. In the inoculated tubercles neither giant-cells nor tubercle bacilli were found. Nothing abnormal in the thorax or abdomen.

V. MITTELSTÄDT.

HOENE (4) gives the microscopical description of two cases of bone-formation in the choroid. Hoene thinks that bone develops in the choroid in embryonic tissue, which is the product of exudation of the choroid. This exudation becomes organized, is changed to connective and finally to bony tissue. The precise localization, and the relation of the osseous tissue to the choroid, therefore, depend only on the intensity and localization of the inflammatory process.

MARCKWORT.

HIRSCHBERG (2) reports the second case of binocular metastatic sarcoma of the choroid and the first to be clinically observed. A woman of fifty-two had been suffering for nine years from a tumor of the mamma, and for three months from visual

disturbance of the right eye. $V = \frac{1}{4}$. At the papilla of the left eye there were a few round yellowish spots, in the right a flat bright thickening of the choroid which raised the retina. The same condition gradually developed in the left eye, while a central scotoma increased in extent. The neoplasms grew rapidly and extended to the upper edge of the optic disc. A myopia of 0.5 D was changed to hypermetropia of 2.5 D. In the right eye detachment of the retina was beginning in the lower portion.

In regard to the prognosis of sarcoma of the choroid, the same author (3) gives an interesting compilation of the thirteen cases which he observed (0.05 % therefore in 21,440). Only two were under forty, one twenty-two, the other thirty-four, the remainder between forty and sixty or over. Death ensued in five cases through metastatic affection of the liver, $1\frac{1}{2}$ years after the enucleation, without a sign of a local relapse, *i. e.*, in 38 % or 62 % respectively, as five of the cases could not be included on account of the brief time for observation. In one fourth of all cases enucleation may be considered a radical operation. A local relapse occurred but once; in two thirds of all the cases death ensued; two have shown no further symptoms for ten and five years respectively. Statistics of thirteen cases, which have partly been reported elsewhere.

KAZANZOW'S (6) patient, twenty-nine years old, when first examined presented the symptoms of chronic absolute glaucoma and cataract; she states that only a month ago she noticed that the eye was blind. Eight months later a large tumor had developed, which extended far beyond the orbit, and was grown together with the lids; the patient was in very poor health. Kazanzow did not venture to operate. He advises to enucleate the eye at once in every case of absolute glaucoma in which an intra-ocular tumor cannot be excluded with certainty.

HIRSCHMANN.

FUCHS (1) describes a case in which he found a large round spot about 4-5 times the diameter of the disc, presenting a light-yellow configuration on a black background; in outline it resembled the arbor vitæ cerebelli. There was no scotoma corresponding to this spot. Probably this anomaly was congenital, and may be classed with the colobomas of the macula lutea.

II.—GLAUCOMA.

1. ABADIE. Des indications de l'iridectomie et de la sclérotomie dans le glaucome. *Bull. gén. de thérap.*, 1882, p. 391.

2. GROSSMANN. Operation for glaucoma. *Ophth. Rev.*, 1, Oct., 1882, p. 332.

3. KNAPP, H. Traumatic loss of the anterior chamber; myopia; anterior chamber restored; acute glaucoma cured with eserine. These ARCH., vol. x, p. 451; *Arch. f. Augenheilk.*, vol. xii, p. 85.

4. KNIGHT. Two cases of increased eyeball tension, one reduced by eserine, the other by atropine. *The Lancet*, No. 11, 1882, p. 804.

5. PARENT. Pathogénie du glaucome primitif. *Rec. d'ophth.*, Dec., 1882. History of the theories of glaucoma.

6. RAMPOLDI. Un notevole caso di glaucoma preceduto da neurite ottico. *Ann. di ottalm.*, vol. xi, 5.

7. TARTUFERI. Sull'anatomia patologica della cornea nel glaucoma. *Giorn. di R. Acad. di med. di Torino*, No. 5-6, 1882.

TARTUFERI (7) has made a microscopical examination of all the corneæ of a collection of glaucomatous eyes, and in most of them found important changes. 1. The epithelium may be pushed apart by liquid between its layers, or cast off, the individual cells losing their form and structure and changing their position; the intercellular spaces are always enlarged. 2. Various finely granular lines become visible in Bowman's membrane; it may be disrupted by an infiltration with wandering cells or in some parts entirely destroyed. The diameter of the cornea may appear shortened by the interposition of connective tissue between the epithelium and the membrane in the periphery of the cornea. 3. The corneal tissue itself frequently becomes infiltrated with wandering cells, which are easily organized into connective tissue, especially in the periphery, while little drops of coagulated albumen are deposited between the fibrillæ and sometimes penetrate into Bowman's membrane. 4. In Descemet's membrane the longitudinal striæ are always more marked; the entrance of wandering cells or adhesion of the iris may produce a break in the continuity. 5. The epithelium is often loosened by drops of liquid, or separated from Descemet's membrane by connective tissue or fibrinous masses. The connective tissue contains more or less pigment.

DANTONE.

In a young man of twenty-nine, who had received a blow on the right eye with a stick, KNAPP (3) observed emptiness of the anterior chamber, reduced tension, and myopia 5.50 D. A few

days after the anterior chamber had been restored an acute attack of glaucoma developed, while V was reduced to $\frac{1}{10}$. Energetic treatment with eserine and morphine alone overcame the attack, restored V, and removed the myopia. Probably a rupture of the globe had taken place at the sclero-corneal margin, and the glaucomatous attack may be explained by a change in position of Fontana's space, as is the case when old corneal fistulas are closed.

In a case of chronic glaucoma with greatly increased tension KNIGHT (4) obtained an immediate effect with eserine, while in another case of glaucoma after recurrent iritis atropine produced the same result. The author emphasizes the fact that increased tension does not always attend glaucoma.

FERGUSON.

RAMPOLDI (6) observed a peculiar attack of glaucoma. A woman of forty-nine had lost the right eye from glaucoma and then became affected in the left with all the symptoms of acute glaucoma (megrin, supra-orbital pain, episcleral injection, slight haziness, and diminished sensibility of the cornea, dilated pupil, shallow anterior chamber, etc.); the intra-ocular tension, however, was not increased and sometimes even seemed below the normal. Examination with the ophthalmoscope revealed no excavation but marked injection of the disc, while the veins were swollen and tortuous, but neither pulsated nor were they bent. After treating her for ten days with salicylate of physostigmine these symptoms disappeared and V improved, but strange to say T increased. A month later the attack was repeated; a broad iridectomy checked it, but ten days later, after severe mental excitement, a third attack set in, when the eye became almost totally blind in spite of a sclerotomy.

DANTONE.

GROSSMANN (2) suggests a new operation for glaucoma, the object of which is to open up the iris angle to a greater extent than can be attained by an iridectomy or sclerotomy. He makes a puncture with a stop paracentesis needle about two mm. from the limbus corneæ, and then introduces a dull-pointed probe bent into the form of a hook. He pushes the convexity of this hook gently but firmly between the cornea and iris as far and in as large a circumference as possible. He gently presses the peripheral part of the iris back toward the lens; this is repeated a few times, and if necessary he then turns the convexity round to another quadrant. He records three cases.

FITZGERALD.

III.—SYMPATHETIC OPHTHALMIA.

1. EATON, F. B. Prophylactic measures against sympathetic ophthalmia in cases of injury ; with report of a curious case of a foreign body in the eye. *Trans. Oregon State Med. Soc.*, 1882.

2. WILD, J. H. Three unusual cases of sympathetic ophthalmia. *Inaug. Dissert.*, Basel, Nov., 1882.

In EATON'S (1) case the foreign body, a piece of steel, penetrated the inner lower quadrant of the cornea and the lens, and embedded itself in the outer portion of the retina. There was some reaction, and the lens became cataractous, but this reaction ceased, and four months later the other eye was still normal. BURNETT.

Wild (2) reports the clinical history of three cases, in which (1) a foreign body had entered the eye and caused uveitis. Seven weeks later choroiditis and papillitis of the other eye. The ciliary body of the enucleated eye, which had undergone extensive changes, was found to be enormously swollen and infiltrated with pus. (2) As a result of gonorrhoeic conjunctivitis : necrosis of the cornea, cicatricial contraction of the iris and ciliary body. Eight weeks later apparently myopia of the other eye, tenderness in the ciliary region, and severe iridocyclitis. (3) Injury, iris healed into the corneal wound, producing chronic traction of the ciliary body, and plastic iridocyclitis. Five months later, sympathetic ophthalmia. The author adheres to the theory of migration.

IV.—LENS.

1. ANDREW, E. Dislocation of the lens. *Brit. Med. Journ.*, Dec. 30, 1882, p. 1292.

2. BENSON. Spontaneous dislocation of the lens into the anterior chamber. *Brit. Med. Journ.*, Dec. 2, 1882, p. 1055.

3. BENSON. Congenital cholesterine cataract. *Brit. Med. Journ.*, Dec. 2, 1882, p. 1055.

4. CARRÉ. Cataracte sénile. Manuel opératoire de l' extraction. *Gaz. d' ophth.*, Nos. 1 and 2, 1883. Extraction downward with a flap 3 mm. high, which lies entirely in the cornea. Irdec-tomy.

5. DOR. Cataracte congénitale. *Lyon méd.*, No. 1, p. 17.

6. FERRIER. Sur la nécessité d' abandonner l' excision de l' iris dans l' opération de la cataracte. *Soc. de chir.*, séance du 27 Dec., 1882. Report on Galezowski's endeavor to re-introduce the old flap-extraction.

7. GALEZOWSKI discusses the same subject, based on a report of forty cases. *Gaz. des hôp.*

8. FÖRSTER On the ripeness of cataract, its artificial ripening, corelysis, and extraction of the anterior capsule. *Arch. f. Augenheilk.*, vol. xii, p. 3. These *ARCH.*, vol. xi, p. 344.

9. FROTHINGHAM. Cases of hard cataract operated according to a modified Graefe method. *Phys. and Surg.*, July, 1882. In thirty-five cases thirty-one good results, two medium, one loss.

10. GALEZOWSKI. De l' étiologie de la cataracte. *Rec. d' ophth.*, Dec., 1882, and Jan., 1883.

11. HASNER. Three cases of ectopia and dislocation of the lens. *Prag. med. Wochenschr.*, vol. vii, No. 46, *Ver. Chron.*, p. 485.

12. LEBER. On cataract and other affections of the eyes in persons struck by lightning. *v. Graefe's Arch. f. Ophth.*, vol. xxviii, 3, p. 255.

13. MOYNE. L' operazione della cataratta nel grande ospedale di Venezia. *Boll. d' ocul.*, vol. v, No. 3, Nov., 1882.

14. MOYNE. Cataratta a forma congenita, verificata in tre fratelli. *Boll. d' ocul.*, vol. v, No. 3, Nov. 1882.

15. PANAS. Sur la cataracte nucléaire de l' enfance simulant la cataracte stratifiée ou zonulaire. Dédutions opératoires, qui en découlent. *Arch. d' ophth.*, vol. ii, No. 6.

16. PASQUIN. Note sur un cas de cataracte capsulaire sénile. *Bull. méd. du nord.*, Jan., 1882.

17. PROUET. Trois observations de cataracte zonulaire. *Rev. d' ocul. du sud-ouest*, vol. viii, 1882, p. 182.

18. SNELL. Lens dislocated into the vitreous becoming catarctous and undergoing absorption. *Ophth. Rev.*, Dec., p. 400.

19. TAYLOR. Eserine before extraction of cataract. *Brit. Med. Journ.*, Dec. 30, 1882, p. 1293. Recommends it.

20. DE WECKER. Quelques perfectionnements apportés a l' extraction de la cataracte. *Ann. d' ocul.*, Nov.-Dec., 1882.

GALEZOWSKI (10) discusses the cause of cataract and reports the case of a man of fifty-five, where he found the cause in an injury received ten years ago in the region of the ciliary body. He intended to extract the cataract; there was, however, a considerable loss of vitreous as soon as the knife had entered, so he modified the operation at once, and performed a division with the knife. No inflammation ensued, and the patient was discharged on the

fourth day. As the operation was performed Dec. 12, 1882, the final result was not yet known at the time of publication. The patient comes twice a week ; the cataract was beginning to break up, and a few flakes had fallen into the anterior chamber.

MARCKWORT.

LEBER (12) reports the case of a sea-captain of thirty-one, who had been struck by lightning, burning the skin of the left side of his body down to the thigh, and producing total hemiparesis of that side. After these affections had been cured, cataract developed in both eyes in the course of a few months, in the left more than in the right, while there was also partial atrophy of the optic nerve, mydriasis, and paralysis of accommodation of that eye. The result of the operation was comparatively good. Five similar cases of cataract were found in searching through the bibliography, eight cases of amaurosis in pre-ophthalmoscopic times, and periodic amaurosis or amblyopia respectively in four cases, among them the interesting one of Reich, of rupture of the choroid. Generally both eyes are affected, rarely (Saemisch) only one. The electric discharge is the cause of all these affections, no matter whether lightning strikes the body itself or only passes close to it. The direct physical, chemical, catalytic action of the electric discharge upon the lens is the cause of the cataract.

BENSON (3) reports a case of cholesterine-cataract in a child a year old, whose entire lens was a mass of bright yellow crystals.

FITZGERALD.

MOYNE (14) found congenital cataract in three children whose parents were not related. In the oldest it was zonular cataract, in the other two ordinary soft cataract.

DANTONE.

PANAS (15) mentions three cases of hard nuclear cataract in children, which closely resembled zonular cataract and were extracted, as the opacity was so extensive that an optical iridectomy was out of the question. There never seems to have been rachitis. In the first case division was performed, when a hard nucleus fell into the anterior chamber and was extracted a few days later. Panas believes that this kind of cataract is more common than is generally believed. As it is very difficult to distinguish with certainty between the two kinds of cataract, Panas recommends extraction without an iridectomy in those cases in which an optical iridectomy or iridotomy cannot be performed.

V. MITTELSTÄDT.

In zonular cataract PROUET (17) performs an iridectomy, but leaves the sphincter, by making a peripheric incision 2 *mm.* long inside, then seizing the iris between the outer third and inner two thirds, drawing it out a little, and cutting it off as close to the forceps as possible.

MARCKWORT.

ANDREW (1) is inclined to look more favorably upon the occurrence of dislocation of the lens into the vitreous, especially if the lens be still enclosed in its capsule. He reports two cases. In one of them the lens was only partially displaced, so he completed it by depressing it, and the result was very satisfactory. He suggests that in certain cases this old proceeding might be revived.

FITZGERALD.

BENSON (2) reports the case of a boy who stated that five years previously, during an attack of panophthalmitis (?) in O D, a "scum" came on O S. The latter was not vascular. Cornea clear. Lens in anterior chamber quite white and opaque, and firmly fixed to posterior surface of cornea to a considerable extent. Lens capsule was ruptured with a needle, and the milky-fluid lens substance escaped, the capsule shrinking up. Slight milky appearance remained where lens had been adherent. V improved. Small patches of choroiditis, only abnormality in the fundus. B. suggests that when O D was attacked with panophthalmitis, there may have been a transient increase of tension in O S, sufficient to cause dislocation of lens but not enough to destroy the sight.

FITZGERALD.

HASNER (11) showed three cases of dislocation of the lens: 1. congenital ectopia in both eyes, and dislocation of the right lens; 2. lens dislocated by an injury, producing sympathetic ophthalmia in the other eye; 3. the dislocation had been produced by a grain of shot penetrating into the eye, and was followed by irido-cyclitis.

SNELL (18) observed a case in which the lens was dislocated into the vitreous by a blow from a piece of steel. It subsequently became opaque, and as it floated to and fro in the vitreous its absorption was observed without difficulty. In about eighteen months it was completely absorbed, and V with $+ 3\frac{1}{2} = \frac{11}{8}$.

FERGUSON.

FÖRSTER (8) first discusses the symptoms of ripeness of a cataract, by which is meant the possibility of removing the whole mass, so that no portion of the peripheric layers must remain

adherent to the capsule. Förster accelerates ripening in slowly developing cataracts by breaking up the anterior cortex by massage of the cornea after previously making an iridectomy. The effect on choroidal cataracts, however, is small. Posterior synechiæ may sometimes be detached in the same way. In order to remove a larger portion of the capsule when performing extraction, Förster seizes it with Liebreich's iris-forceps, and tears the anterior capsule. The results are very satisfactory.

WECKER (20) reports the results of 366 extractions performed during the last sixteen months: he did not have a single case of suppuration. He ascribes this good result to the strict observance of the following precautions: 1. Exact closure of the wound with a well-adapted conjunctival flap. 2. Disinfection of the wound with a spatula dipped into a 2½% solution of carbolic acid (no spray). 3. Careful excision of the iris, so that no part of it or the capsule in particular lies in the wound. After the operation Wecker examines once more with artificial light for remnants of capsule, closure of the wound, etc.

MARCKWORT.

MOYNE (13) reports that in the ophthalmic division in charge of Fenoglio, of the great hospital at Venice, 500 patients are treated annually, ninety-five beds being at his disposal. To the end of September, 1882, forty-five extractions were performed. The percentage of loss has gradually been diminished from 13% to 3%.

DANTONE.

V.—VITREOUS BODY.

1. NIDEN. On recurrent idiopathic hemorrhage into the vitreous in young men. *Sitzungsber. d. ophth. Ges. zu Heidelberg*, 1882, vol. xiv, p. 8.

2. UNTERHARNSCHIEDT. A case of rupture of a persistent hyaloid artery due to progressive myopia. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 449.

NIDEN (1) reports nine cases of idiopathic hemorrhage into the vitreous, affecting six young men between the ages of fifteen and twenty-four. It always occurred suddenly. There were no symptoms of dyscrasia; a direct cause could not be found. Absorption generally was equally rapid, though, as a rule, another attack soon followed. The peripheric equatorial portions of the retina or choroid respectively seemed to be the source of the hemorrhage. The macula always remained more or less intact. Almost all cases were cured; in one only a high degree of myopia remained.

These hemorrhages probably stand in close connection with the irritation of the blood-vessels due to the sexual development, as is the case with the epistaxis so frequently observed at this time of life. The sexual development of all the young men was retarded.

UNTERHARNSCHIEDT (2) found a thread as thick as a pin connecting the papilla with the posterior surface of the lens in a young myope ($M \frac{1}{2}$), apparently a remnant of the hyaloid artery. Three years later, the myopia having increased to $\frac{1}{2}$, this thread had parted and floated about in the vitreous. He explains this by the increased expansion of the globe, which was also proved by the increased size of the posterior staphyloma.

VI.—RETINA AND FUNCTIONAL DISTURBANCES.

1. AYRES, S. C. Retinitis albuminurica. *Columbia Med. Journ.*, Aug., 1882. Among 104 cases of albuminuria, retinitis was observed in nine of them, = 8.6 %

2. BERT. Observations sur le siège du scotome scintillant. *Compt. rend. hebdomadaire des séances de la société de biologie*, vol. xxix, 1882.

3. BORTHEN, L. Amblyopia centralis nicotianica. *Norsk Magazin for Lægevidenskab*, vol. xii, No. 12, Christiania, 1882. Two cases observed in women.

4. DEUTSCHMANN. On blinding of the retina by direct sunlight. *v. Gräfe's Arch. f. Ophth.*, vol. xxviii, 3, p. 241.

5. FANO. Faculté chromatique dans l'amblyopie alcoolique et nicotinique. Valeur sémiologique du scotome central dans cette affection. *Journ. d'ocul.*, No. 114, p. 193, Aug., 1882.

6. FONTAN. De l'héméralopie tropicale. *Rec. d'ophth.*, Oct., 1882.

7. HIRSCHBERG. 1. Retinal affection in syphilitic persons. 2. Atheromatous degeneration of the retinal arteries. 3. Retinitis centralis punctata et striata. *C. f. A.*, vol. vi, p. 327.

8. LEBER. On the cause of detachment of the retina. *Sitzungsber. d'ophth. Ges. zu Heidelberg*, vol. xiv, 1882, p. 18.

9. MARTIN. Du décollement de la rétine. *Journ. de méd.*, Mar. 11, 1882.

10. NIEDEN. Case of fracture of the base of the skull, amaurosis of the left eye; temporal hemianopsia; paralysis of the right external rectus muscle; diabetes insipidus. Diagnosis: partial rupture of the chiasm. Two cases. *Arch. f. Augenheilk.*, vol. xii, No. 3. Next number of these ARCHIVES.

11. NORRIS, W. F. Embolism of the superior temporal branch of the central retinal artery of the left eye. *Amer. Journ. of Med. Sci.*, Oct., 1882.

12. PARINAUD. Thrombose de l'artère centrale de la rétine suivie de ramolissement cérébral. *Gaz. méd.*, No. 50, 1882.

13. RAMPOLDI. Amaurosi unilaterale (isterica ?) senza reperto oftalmoscopico visibile. Guarigione dopo tre mesi di cura. *Ann. di ottalm.*, vol. xi, 4.

14. REICH. Pregnancy, papillitis, with loss of vision ; rapid recovery. *Medic. Wjestnik.*, 1882, Nos. 39 and 40.

15. RENANT. Sur la rétine du type juxta-épendymaire. *Rev. génér. d'ophth.*, June, 1882.

16. SCHWEIGGER. Observations on detachment of the retina. *Arch. f. Augenheilk.*, vol. xii, p. 52. These ARCHIVES, vol. xi, p. 451.

17. SNELL. Amaurosis fugax. *Ophth. Rev.*, Dec., 1882, p. 400.

18. STORY. Glioma of the retina. *Brit. Med. Jour.*, Dec. 23, 1882, p. 1256. Demonstration of three cases.

19. VOSSIUS. A case of bilateral central scotoma, and the anatomical and pathological condition. Contribution to the knowledge of the course of the nerve-fibres to the macula in the optic nerve, chiasm, and optic tract. *v. Graefe's Arch. f. Ophth.*, vol. xxviii, 3, p. 201.

HIRSCHBERG (4) reports three cases of retinal affections : 1. In a syphilitic person of thirty-nine, who had been infected two years ago, V was reduced to $\frac{4}{8}$, while there was a hazy opacity in the vitreous, and a slight hemorrhage near a small retinal artery. This was absorbed, but a perivascular degeneration of the connective tissue, with numerous small offshoots, remained in the retina. 2. In a debilitated man of fifty-one, in whom sclerosis of the large blood-vessels was plainly marked, there were also atheromatous degeneration of the retinal arteries, and partial atrophy of the optic nerve. The papilla was covered with a new-formation of connective tissue spread out like a fan. Most of the arteries had whitish envelopes. Upon and at the left papilla were glittering points in the sheath. In the right eye there was marked concentric limitation of the field of vision, in the left a central scotoma, while the boundaries of the field of vision were almost normal ; death

from apoplexy. 3. In connection with the case published by Mooren, of retinitis punctata albescens, the author thinks that the disease should be subdivided into four or five groups, and adds the history of three cases : 1. A woman of fifty-nine, suffering from atheromatous degeneration of the blood-vessels, palpitation of the heart, chemical changes in the urine, etc.; there were whitish punctate deposits between the macula and papilla, arranged like a star, which finally disappeared without a trace. Vision was restored to its normal degree, and remained so until death from dropsy ensued. 2. A woman of fifty-eight, who suffered from a gastric affection, and whose urine contained a large portion of uric acid; there were an extensive extravasation of blood between the macula and papilla, and a delicate whitish spot in the fovea. This spot, in the course of months, changed into a semi-stellate figure, which lay behind the retinal blood-vessels. At the same time there were a central scotoma and micropsia. The latter symptom disappeared, as did also the white infiltration. 3. In a woman of sixty-two, whose urine was normal, there were bright white spots in the centre of the retina, which gradually disappeared.

Based on his experiments on the introduction of foreign bodies into the vitreous, LEBER (8) believes that a rupture frequently precedes detachment of the retina. The edges of the wound are always drawn inward, indicating that the rupture was produced by a strain from within the eye. The irritation of the vitreous, caused by the foreign bodies, leads to the formation of cicatricial tissue; the strain thus produced tears the retina, the vitreous penetrates behind it, and the detachment is complete. In fourteen out of twenty-seven cases which were examined, the point of perforation could be found, so that the above theory holds good very often.

SCHWEIGGER (16) attaches less weight to the shrinkage of the vitreous; there must always be a disturbance in its nutrition. Sudden large detachments probably develop out of small peripheral ones. He advises an early puncture where there is no rupture, and salicylate of soda to produce thorough perspiration.

NORRIS (11) observed in a young man of twenty-nine suffering from affections of the mitral and semilunar valves, sudden amblyopia, involving the whole field of vision except upward and to the left. The ophthalmoscope revealed a yellowish-white embolus at the bifurcation of the upper temporal branch of the retinal artery.

The upper portion of the bifurcation formed a white stripe a short distance above the papilla, above and beyond it contained some blood ; the temporal portion was a white stripe, four papilla-diameters long, beyond it there was a whitish reflex along the blood-vessel. The retina corresponding to this region, was opaque, especially in the horizontal meridian. The macula lutea was red as usual. Absorption and return of vision gradually took place.

PARINAUD (12) found, in a woman of seventy-one with atheromatous degeneration of the arteries and heart-disease, thrombosis of the central retinal artery of the left eye. At first there was only a temporary obscuration of the visual field without any cerebral symptoms. Soon after a large central scotoma was observed, peripheric limitation of the field of vision, and color-blindness, while the ophthalmoscope revealed no changes. Three days later, amaurosis with the usual ophthalmoscopic appearance. Later cerebral symptoms, which Parinaud attributes to the same changes in the blood-vessels of the brain. Parinaud compares the œdema, the dilatation of the capillaries, and the hemorrhages in the retina with the red, the subsequent atrophy with the white, softening of the brain.

V. MITTELSTÄDT.

DEUTSCHMANN (4) reports the clinical history of four cases of functional anomaly, the affection being "blinding of the retina" produced during the observation of the solar eclipse of July, 1879. The ophthalmoscope revealed the same condition in all : a small white spot in the region of the fovea with a sharp, blood-red edge, the normal ring of reflection around the macula only faintly indicated ; positive central scotoma. Vision was never perfectly restored. Material changes had therefore taken place in the retina. Similar conditions were produced in animals, the heat-rays being of course excluded. The result here was a momentary coagulation of the albumen in the retina ; the tissue affected was not restored, cicatricial tissue takes its place, and finally we obtain the picture of disseminate choroiditis. The author is therefore inclined to believe that the latter disease may sometimes be due to a similar cause, especially in fire-workers. (The Rev. cannot verify this supposition from his own statistics, as the percentage of choroiditis disseminata is much larger in miners than in the employés of the iron and Bessemer steel furnaces.)

FONTAN (6) believes that hemeralopia must be considered a disease of itself ; it is connected with general anæmia and

especially malaria. The subjective symptoms are amblyopia, paresis of accommodation, dyschromatopsia, and sometimes peripheral limitation of the field of vision; the objective symptoms are dilatation and sluggishness of the pupil, stagnation in the retinal veins, ischæmia of the retinal arteries, and circumscribed serous transudation in the retina. The prognosis is generally good, though the end in some cases is dubious. It is best treated with eserine.

MARCKWORT.

FANO (5) doubts the diagnostic value of the central color-scotoma in amblyopia *e potu*, but lays stress upon the relation between vision and the scotomas. The author reports a case in which the scotomas were more marked in the better eye, while in the poorer they were less so.

MARCKWORT.

NIEDEN (10) reports two cases of amaurosis of one eye and temporal hemianopsia of the other eye from fracture of the base of the skull; loss of hearing in one ear, and paresis of the external rectus of the better eye. Probably its chiasm was ruptured. Atrophy in the amaurotic eye, slight improvement in the preserved portion of the visual field. Hearing was not restored.

RAMPOLDI (13) reports a case of hysterical amaurosis in a girl of eighteen suffering from conjunctival catarrh, severe photophobia, and lachrymal secretion. She had an attack of megrim lasting for hours, and next day became entirely blind in the left eye, while in the eye itself no change was perceptible except the immovable pupil. Her general health improved after an antiphlogistic treatment of two months; the megrim ceased, but the eye remained blind. In the third month, after giving chloral and large doses of quinine, vision gradually returned and finally reached $\frac{3}{8}$. From beginning to end the ophthalmoscope had revealed no change.

DANTONE.

SNELL (17) observed a case of amaurosis fugax in a girl of nine years who, after feeling unwell for a day or two, became suddenly giddy and lost all perception of light. The pupils were dilated and fixed, and no abnormality could be discovered with the ophthalmoscope. After two days, perception of light returned and subsequently vision improved by degrees till in six weeks $V = \frac{3}{8}$ and $J = 1$.

FERGUSON.

VOSSIUS (19) reports another case, the third on record, of central amblyopia, in which an autopsy was made (Samelsohn and Nettleship). The case was one of a man with right-sided hemi-

plegia, without any cerebral symptoms except a slight impairment of speech ; fundus normal ; central scotoma. The autopsy showed an abscess 2 *cm.* long and broad, with the pia mater adherent in the anterior central convolution. The upper third of the latter was completely softened, but the posterior central convolution was healthy. Under the abscess there was a cyst. Otherwise the brain was normal. Externally the optic nerve, chiasm, etc., also appeared normal. The microscopic examination, however, revealed the same atrophic degeneration as in Samelsohn's case (*cfr.* *Rep. Arch. f. Augenheilk.*, vol. xii, p. 247), the same course, the same changing form of the atrophic fascicle, and the same distribution in the retina, so that also the conclusions in regard to the nerve-fibres supplying the macula lutea must be the same. In this case, however, the atrophic fibres could be traced nearer to their origin than in the other.

VII.—OPTIC NERVE.

1. BULLER, F. Remarks on neuritis. *Can. Med. and Surg. Journ.*, June, 1882.
2. EWETSKY. Case of endothelioma of the outer sheath of the optic nerve. *Arch. f. Augenheilk.*, vol. xii, p. 16.
3. HUC. Des tumeurs du nerf optique. *Thèse de Paris*, May 16, 1882.
4. MANZ. On endothelial degeneration of the optic nerve. *v. Gräfe's Arch. f. Ophth.*, vol. xxviii, 3, p. 93 ; and *Sitzungsber. d' ophth. Ges. zu Heidelberg*, 1882, p. 162.
5. NIEDEN. Contusio med. spinalis et cerebri. Unimportant initial symptoms, then progressive spinal affection (ataxy), exophthalmus of both eyes, atrophy of optic nerve, gradual improvement of general health. *Arch. f. Augenheilk.*, vol. xii, p. 45.
6. RAMPOLDI. Della stricnina nella cura dell' atrofia dei nervi ottici. *Ann. di ottalm.*, vol. xi, 5.
7. REICH. Loss of vision from papillitis in a pregnant woman ; rapid recovery under treatment. *Klin. Monatsbl. f. Augenheilk.*, vol. xx, p. 349 ; and *Medicinsky Wjestnik.*, 1882, Nos. 39 and 40.
8. VOSSIUS. Myxosarcoma of the optic nerve. Contribution to the knowledge of the genuine tumors of the optic nerve, *i. e.* those developing within the outer sheath. *v. Gräfe's Arch. f. Ophth.*, vol. xxviii, 3, p. 33.

BULLER (1) thinks that none of the present theories sufficiently explains papillitis in cerebral affections. He reports cases of neuritis connected with dysmenorrhœa. He considers Hughlings-Jackson's mode of treatment the best—mercury and iodide of potassium.

BURNETT.

NIEDEN (5) reports a case of concussion of the spinal column produced in a young man of eighteen by a fall to a great depth. Nine months later, headache, giddiness, ataxic symptoms, exophthalmus, diminution of sight, and atrophy of the optic nerve developed. The right side especially was affected. He gradually improved, the exophthalmus subsided, ataxy diminished, but the atrophy of the optic nerve increased, and in the right eye posterior polar cataract developed. The cause of the atrophy may be referred with certainty to the influence of the spinal cord on the vaso-motor system of the eye.

REICH (7) observed loss of vision in a girl of sixteen of extravagant habits, who was in the seventh month of pregnancy, and had suffered from hysterico-epileptic attacks; the papillæ appeared hyperæmic and swollen. There was also marked photophobia of one eye. Energetic derivative treatment restored sight in a few days, while the choked disc disappeared; later, complete recovery. The case may be set down as one of neuritis, as it is observed by reflex action in suppression of the menses and deviation of the uterus.

EWETSKY (2) found, in a boy of fourteen, left-sided exophthalmus, which had been increasing for eight years, produced by a tumor of the outer sheath of the optic nerve; it had completely spared the inner sheath and the optic nerve by which it was penetrated, and proved to be an alveolar sarcoma or rather an endothelioma, with deposits of genuine bone in its interior. Only three similar cases are on record (Billroth, Neumann, Knapp). There was a relapse three months later.

MANZ (4) reports the case of a man of sixty suffering from atrophy of the papillæ, amaurosis, and psychical disturbances of a high degree. The post-mortem showed diffuse chronic basilar meningitis. The optic nerves were increased at the optic foramen to a thickness of 7 mm. by clusters of endothelial proliferations springing from the pial sheath of the optic nerve. From the optic foramen the thickness decreased in both directions. The nerve fibres and septa of connective tissue were completely pushed

aside. The medulla disappears first. There were no round cells. There was also thrombosis of the central retinal vein, though this might be of more recent origin. The impulse to the endothelial proliferation was probably given by a transudation coming from the cranial cavity along the sheath of the optic nerve.

VOSSIUS (8) remarks in a general discussion of the twenty-seven cases of tumors of the optic nerve thus far reported, that 14 of them, = 51.85 %, were sarcomas; 6, = 22.2 %, myxomas; 5, = 14.8 %, fibromas; 1, a scirrhus carcinoma; and 1, a genuine neuroma (Perls). They occur principally in childhood up to the age of eighteen, so that they do not originate during the foetal period. Vossius adds seven more reported cases, and two of his own. 1. A boy two and a half years old suffered from amaurosis of the left eye and papillitis. It was found to be due to a tumor of the optic nerve, which proved to be a myxosarcoma composed in part of long fibrous cells. Three years later there had been no relapse. 2. In a boy eight years old there were amaurosis and white atrophy of the optic nerve, due to tumor of the latter, a very vascular myxosarcoma, which had developed in the posterior portion of the optic nerve within the outer sheath. It consisted of spindle-cells with long and spiral offshoots. No relapse nine months later. Perls' case is also probably a pure myxosarcoma, the occurrence of neuromas being very doubtful.

RAMPOLDI (6) has lately obtained good results in atrophy of the optic nerve by using strychnine. He injects it subcutaneously and gives it internally in form of the infus. Fab. S. Ignazii. He injects 0.001 of strychn. nitr. once or twice a day, and sometimes gives as many as 60-70 injections. Of the five cases reported in detail three were genuine white atrophy, and the other two were the result of optic neuritis. The results of the treatment in the latter two cases were excellent in regard to vision; in one of the patients chronic strychnine-poisoning ensued, which lasted many months. In the three cases of white atrophy the results were not so brilliant, though there was decided improvement. In one of the latter cases there was also marked hemeralopia; this disappeared entirely under the treatment. The author thinks that in two of the patients the disc regained a slight reddish tint. Unfortunately no determinations of the field of vision were made.

DANTONE.

VIII.—INJURIES (FOREIGN BODIES).

1. BENSON. Sudden amaurosis of left eye resulting from gunshot injury to the right. *Brit. Med. Journ.*, Dec. 2, 1882, p. 1085.

2. BENSON. Injury to the optic nerve without injury to the globe. *Brit. Med. Journ.*, Dec. 2, 1882, p. 1085.

3. PESCHEL. Comunicazione sopra un caso di cisticerco sottoretinale. *Giorn. d. R. Acad. di med. di Torino*. No. 10-11, 1882.

4. SNELL. Blow on eye. Injury to optic nerve. *Ophth. Rev.*, Dec., 1882, p. 402.

BENSON (1) relates the following curious case. A young girl was sitting in a kitchen, and a few yards away from her right hand a man was cleaning a gun. The latter went off and some of the shot entered her O D. She retained sight in O S sufficiently long to see him lay the gun on the table, and then it vanished completely and did not return. When B. saw her some weeks later O D was completely collapsed. O S externally quite normal. Lens clear and tension normal. Optic nerve completely atrophic. Grain of shot probably passed through O D pierced bony septum, and wounded optic nerve, its sheath, or large blood-vessels.

FITZGERALD.

BENSON (2) reports the case of a boy who while playing with another boy received a thrust in the face from an old broken foil. O D at once became blind. Lids swelled. There was slight external hemorrhage, and he suffered considerable pain. Ophthalmoscope showed no change in fundus. Pupil half-dilated. V = O. Very slight papillitis resulted in a few days, and total atrophy finally occurred. V subsequently improved to seeing fingers badly at four inches at portion of field of vision. Movements of globe normal. B. believes that the blunt point of the foil penetrated deeply beneath the globe and nipped the nerve probably just at its entrance through the optic foramen.

FITZGERALD.

In SNELL'S (4) case there were considerable ecchymosis and absolute loss of vision. No ophthalmoscopic change, but the disc subsequently atrophied. Treatment was of no avail.

FERGUSON.

PESCHEL (3) describes a case of cysticercus observed in a cook. The operation performed by Reymond was in so far not successful

(in correction of the report in the last number of these ARCH.), as about half a teaspoonful of yellowish liquid was discharged, but not the worm itself when the sac was opened from the sclerotic. The worm was probably dead and adherent; nor could Reymond see the movements, before the operation, which Peschel had noticed. This cysticercus is not the second, as stated erroneously before, but the fourth observed in Italy (one in Catania, three in Turin).
DANTONE.

IX.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

1. ARMAIGNAC. De la cécité des mots. Communication a la réunion des soc. sav. de la Sorbonne, April 13, 1882. *Rev. d'ocul. du sud-ouest*, p. 73, 1882.

2. BRADBURY. Absence of eye-symptoms in cerebellar tumor. *Brit. Med. Journ.*, No. 4, 1882, p. 895.

3. CORNWELL, H. G. Purulent cyclitis from septic embolism of the eye in a case of phlegmonous erysipelas. *N. Y. Med. Rec.*, Aug. 12, 1882.

4. COÛMES, M. F. Menstrual amblyopia. *Amer. Med. Herald*, Oct., 1882.

5. DENISSENKO, G. S. The changes in the eye in Bright's disease. *Med. Wjestnik.*, 1882, No. 49-50, and 1883, Nos. 2, 3, 6 etc; not yet completed.

6. DICKINSON. Double optic neuritis and loss of vision in meningitis. *Brit. Med. Journ.*, Oct. 14, 1882, p. 725.

7. FÉRÉ. Contribution a l'étude des troubles fonctionels de la vision par lésions cérébrales (Amblyopie croisée et hémianopsie). *Thèse de Paris*, 1882, No. 107.

8. FÉRÉ. De l'hystérie chez les jeunes garçons. *Le progr. méd.*, Nos. 50, 51, 1882, and Nos. 1 and 5, 1883.

9. GILLES DE LA TOURETTE. Rotation et déviation conjuguées de la tête et des yeux du côté droit, hémiplegie et hémianesthésie droite; contracture du bras gauche sans anesthésie; absence de lésions cérébrales, cérébelleuses, et médullaires, petit faisceau de sclérose bulbaire d'ancienne date. Société anatomique, 1882. The case is not clear.

10. HOLMES. Case of puerperal retinitis producing blindness and loss of color-perception. Recovery. These ARCH., vol. x, p. 421; *Arch. f. Augenheilk.*, vol. xii, p. 89.

11. MCKAY, R. J. Ocular affections from suppression of the menses. *Amer. Fourn. of Med. Sci.*, Oct., 1882.
12. KRASSOWSKY. Observations on malarial fever. *Wratscheb-Wjedomoski*, No. 39.
13. LEBER. On cataract and other ocular affections produced by a stroke of lightning. *v. Graefe's Arch. f. Ophth.*, vol. xxviii, 3, p. 225.
14. NETTLESHIP. Value of eye-symptoms in the localization of cerebral disease. *Brit. Med. Fourn.*, Dec. 2, 1882. pp. 1081-1084.
15. NIEDEN, A. Report of cases of ocular affections from injuries to the brain and spinal cord. *Arch. f. Augenheilk.*, vol. xii, pp. 30-52. Next number.
16. ORSOLINI. Contriburioni alla casistica circa l'emeralopia dipendente dalle affezioni epatiche. *Imparziale Ann.*, vol. xxii.
17. RAMPOLDI. Sulle cause meno frequenti dell'astenopia. *Ann. di ottalm.*, vol. xi, 4.
18. RAMPOLDI. Rapporti morbosi esistenti fra gli organi della respirazione e l'organo della vista. *Ann. univ. di med.*, No. 261, 1882.
19. ROSANDER, Prof. and BERG, A. Fall of hyerntumör med konsekutiva symptom från ögonen. *Hygea*, No. 12 ; *Svenska Läk. Selskap Förhandl.*, pp. 258 and 251, Stockholm.
20. SANTOS FERNANDEZ. On blindness in yellow fever. These ARCH., vol. x, p. 440 ; *Arch. f. Augenheilk.*, vol. xii, p. 92.
21. SMITH, S. Eye-symptoms in locomotor ataxy. *Brit. Med. Fourn.*, Nov. 4, 1882, p. 876.
22. SNELL. Atrophy of optic disc after hemorrhage. *Ophth. Rev.*, Dec. 3, p. 403.
23. SNELL. Atrophy of optic disc after enteric fever. *Ophth. Rev.*, Dec., 1882, p. 403.
24. SUCKLING, C. W. Lateral spinal sclerosis with optic neuritis. *Brit. Med. Fourn.*, Dec. 9, 1882, p. 1152.
25. THOMSON (J. R. Wolfe's clinique). Syphilitic inflammation of the eye. *Med. Times and Gaz.*, Dec. 14, 1882, p. 720.
26. URBANTSCHITSCH. The influence of affections of the external and middle ears on the senses, especially sight. *Wiener med. Blätter*, No. 42, p. 1295 ; *Sitzungsber. d. Kais. Ges. d. Aerzte in Wien*.

RAMPOLDI (17) discusses the accommodative asthenopia, often only temporary, which is occasionally observed in general affections of the body, and which should interest the general practitioner as well as the oculist. According to Rampoldi, the affections which sometimes affect the power of accommodation are especially a general state of weakness after severe sickness, particularly typhoid fever and diphtheria, hemorrhage, etc. The power of accommodation is sometimes diminished by reflex action transmitted through the fifth nerve (conjunctivitis, carious teeth, etc.) or from the spinal cord and sympathetic nerves (commencing tabes, hysteria, uterine diseases, and gastric affections); even the normal course of digestion sometimes reduces the breadth of accommodation for a few hours; the asthenopia of drunkards and smokers must be ascribed to the stomach. Frequent mental excitement also affects the power of accommodation.

DANTONE.

NETTLESHIP (14) discusses the question of the value of eye-symptoms in the localization of cerebral disease. He considers that "the whole subject naturally falls into two divisions, according as disturbances of vision and sensation or affections of ocular movement cause the symptoms we have to examine." As a point of importance in the differential diagnosis of cases of single optic neuritis depending on brain disease and those in which the disease is not situated farther back than the optic foramen, N. is of opinion that in the latter the signs of the oedema and venous stasis are usually more marked. In speaking of cases of blindness without visible changes, in infants, N. says he formerly thought that the prognosis was necessarily fatal as regards sight, but more lately he has seen recovery of sight, apparently perfect, take place in several cases. Some of these cases showed signs of slight hydrocephalus, but others, as far as he could judge, were quite free from all signs or symptoms of cerebral disease. In concluding, he alludes to a subject upon which, as he says, observation is needed, namely, uniocular diplopia from cerebral disease. Several cases have been reported, and yet the symptom is so unintelligible that a very natural scepticism prevails regarding it.

FITZGERALD.

NIEDEN (15) reports a case of cerebral lesion (*cfr. antea*), in which a knife penetrated the left temporal bone, producing right-sided hemiplegia without any sensory disturbance, paralysis of the left abducens, and sensory aphasia. These symptoms are explained by assuming that the knife, penetrating obliquely

into the temporal bone, had injured the motor centre of the extremities near the central convolution, and the centre of memory for words, and probably, also, the origin of the abducens of the left side.

SMITH (21) recounts the history of two interesting cases of locomotor ataxy—referring specially to the syphilitic origin of the disease and its treatment by iodide of potassium. In one case the first symptoms noticed were dimness of vision, drooping of left eyelid, dilatation of right pupil, and external strabismus. The patient became completely blind a year and a half before his death. In the other case, the sight at the patient's first admission into the hospital was good, but the Argyle-Robertson-pupil symptom was well marked. On readmission a considerable improvement took place in general symptoms with the use of iodide of potassium. The sight was never dim. FITZGERALD.

SUCKLING (24) reports a case of this disease, the signs of which were more marked on the right side. The patient's eyes were examined by Mr. Priestley Smith, who found evidence of optic neuritis in the right one.

DICKINSON (6) reports a case of double optic neuritis and loss of vision in meningitis. No strabismus or ptosis. Pupils large and sluggish; symptoms of papillitis more marked in the right eye than in the left. About six weeks later the neuritis was still marked in left eye, but four weeks afterward signs of atrophy began to appear. For a period of over three months she remained in a semi-comatose condition with the head greatly detracted, with considerable rigidity of the muscles, and passing her evacuations without any movement or notice on her part. About two months later she had so far recovered as to be able to speak quite rationally and to use her hands. The pupils were widely dilated, but she could not see at all. Some weeks later the discs are reported as pale, but not excessively so; the margins not very sharply cut; the arteries were small, and the veins tortuous. The following month vision began to return. The last note, made about sixteen months after the commencement of the attack, states that the pupils were of medium size, smaller than they used to be, but equal; the optic discs whiter than usual, with well-defined edges, the veins not large, but tortuous. The sight, so far as could be tested, was quite good in relation to acuity, field of vision, and perception of colors. FITZGERALD.

URBANTSCHITSCH (26) explains the influence of affections of the external and middle ears on sight, by reflex action, and even believes that he can confirm this by photometric measurements. The reflex action is transmitted through the fifth nerve.

COOMES (4) reports four cases of menstrual amblyopia. The main symptoms were amblyopia, varying from a very slight loss of visual power to almost total blindness, photophobia, burning and stinging sensations in the lids, and sometimes deep-seated pain in the eye and slight conjunctival injections. These symptoms disappeared when menstruation returned.

BURNETT.

HOLMES (10) saw a case of total blindness with albuminuria, in the sixth month of pregnancy, due to marked exudative retinitis and detachment of the retina. After delivery, vision slowly returned, but color-blindness remained for three months, when first blue, then yellow, then brownish-red, and finally green, were again recognized.

McKAY (11) describes twelve cases of ocular affections from suppression of the menses. In almost all of them the symptoms manifested themselves at the beginning of the menses or soon afterward. Choked disc was frequently observed, sometimes double vision, and very often asthenopia. V was diminished in some cases. When these symptoms are observed in eyes apparently normal in external appearance, especially in girls, the regularity of the menses should always be inquired into.

BURNETT.

In speaking of the treatment of hysteria in young men, FÉRE (8) discusses, besides other affections of the senses, also those of the eye. In hemianæsthesia there is also amblyopia of the eye of the same side, which seldom ends in amaurosis. At the same time the field of vision is impaired in both eyes when the anæsthesia is general or unilateral, but combined with analgesia of the other side. The perception of space and light is also reduced, but most of all, color-perception; sometimes it is only slightly affected, while sometimes there is complete color-blindness. Yellow and blue are recognized longest, though there are exceptions where red is the only color recognized or its field of vision is the most extensive, as shown by an observation of Parinaud and several of his own. No ophthalmoscopic changes.

v. MITTELSTÄDT.

CORNWELL (3) reports a case of purulent cyclitis after phlegmonous erysipelas. Only the right eye was affected under the usual symptoms of purulent cyclitis. The author has collected 48

cases of septic embolism of the eye, 39 of whom died. The author's case was not accompanied by severe inflammatory symptoms like chemosis, swelling of the lids, exudation into the pupillary space, etc., which he thinks is the reason why the embolism developed in the ciliary body and suppuration afterward set in in the choroid.

BURNETT.

KRASSOWSKY (12) observed the following ocular affections in malarial fever: 1. Intermittent ophthalmia. In a patient twenty-three years old hyperæmia of the conjunctiva, œdema of the lids, photophobia, pain in the depths of the orbit, pupils contracted. Spleen enlarged. On the following day all these symptoms had vanished. On the third day a similar attack. On the fourth he was well again. On the fifth a regular paroxysm of fever. Cured with quinine. 2. Malarial hemeralopia. The author observed in the fever district three cases of hemeralopia which yielded to quinine.

HIRSCHMANN.

SANTOS FERNANDEZ (20) discusses three cases of blindness from yellow fever, a severe complication of this disease which heretofore has been scarcely noticed. One patient recovered and his vision was completely restored; the other two died. The ophthalmoscope revealed nothing abnormal in the fundus.

SNELL (23) reports a case of atrophy after enteric fever, in which vision suddenly failed in the left eye; disc atrophied; V. perception of light; right reads J 1. Embolism was probably the cause.

FERGUSON.

ORSOLINI (16) investigated the alleged frequency of hemeralopia in affections of the liver. Among four severe cases he found it only once in a case of atrophic cirrhosis, in which it continued and constantly increased until the patient died. No report of the appearance of the fundus or the vision of the patient.

DANTONE.

RAMPOLDI (18) has observed a few cases of neuroparalytic keratitis in convalescents, from adynamic pneumonia due to malaria. Once, in a case of empyema, he observed metastatic panophthalmitis.

DANTONE.

THOMSON (25) reports four cases of syphilitic inflammations of the eye, one of choroiditis, one of retinitis, one of papillitis, and one of episcleritis, all of which did well under antisyphilitic treatment.

FERGUSON.

MISCELLANEOUS NOTES.

A. Lüer, known to oculists as one of the best instrument makers, died at Paris Feb. 20, 1883, eighty-one years old. He was a native of Brunswick, Germany.

The eighth meeting of the International Medical Congress will take place at Copenhagen, Aug. 10 to 16, 1884.

The French Ophthalmological Society met for the first time Jan. 29 to 31, 1883, at Paris.

The fifteenth meeting of the German Ophthalmological Society will take place at Heidelberg, Sept. 9 to 12, 1883.

The nineteenth annual meeting of the American Ophthalmological Society will be held, July 18th and 19th, at the Kaaterskill House, Catskill Mountains, New York.

ERRATUM.—The third *International Otological Congress* will be held in Sept., 1884, not 1883, as erroneously stated in the *Archives of Otology*, vol. xi, p. 184.

ARCHIVES OF OPHTHALMOLOGY.

THE REPRESENTATION OF THE LIMITS OF THE VISUAL FIELD.

BY DR. RICHARD HILBERT, KÖNIGSBERG, PRUSSIA.

(*With five wood-cuts.*)

Translated by Dr. J. B. McMAHON, New York.

THE determination of the boundaries of the visual field has long been the object of scientific study. Ptolemy¹ was the first to investigate the subject. In later times, it attracted the attention of Thomas Young, Wollaston, Purkinje, and others. But it was reserved for v. Graefe to recognize the value of the measurement of the field of vision, as an important aid in the diagnosis of pathological conditions.

For the mapping of the visual field, A. v. Graefe employed a blackboard provided with a scale in four meridians. The patient was placed before it, with one eye covered and the gaze of the other fixed on a white point which marked the centre of the board.

The examiner slowly moved a piece of chalk on a black handle from the periphery to the centre, and noted the point at which the chalk became visible.

This was done with the successive meridians on the board, the points so obtained were joined by straight lines, and a copy of this diagram of the visual field could be made on a reduced scale and appended to the patient's history.

This is even now, as we shall show farther on, the best method for registering the field of vision.*

S. Arago, "Astronomie" Bd. i, page 145.

* We fail to see that the author has succeeded in demonstrating the superiority

Later, Aubert¹ employed in his own physiological investigations, a new instrument for measuring the visual field, the perimeter, which was then introduced into ophthalmic practice by Förster.

The construction and use of this instrument are well known; in its original form it is pictured in Aubert's "*Physiologie der Netzhaut*," p. 116, fig. 19.

More recently, improved forms of the perimeter have been devised. The hemispherical perimeter of Scherk may be regarded as the best type of the improved instrument. On account of the greater ease of manipulation and the more truthful appearance of the visual fields registered by it, it is far superior to the instruments of Aubert and Förster, which, for distinction, we will call the bow-perimeter.

If, now, the visual field, as determined with the perimeter (of any form whatever), is to be represented on paper, a chart is employed consisting of a series of concentric circles. As, however, the interval between any one circle and the adjoining ones is constant, it is self-evident that such a chart does not give a correct picture of the real field of vision. In order to obviate this difficulty, Hirschberg designed charts² in which the concentric circles had foreshortened radii; although these are much better than those mentioned above, they are still defective, as can be proved by a simple geometrical construction.

The fields of vision mapped out on the board, and which can be regarded as central projections on the tangent plane to the perimeter at its pole, are entirely free from such errors. The importance of the angles of the boundary of the visual field, which are read from the perimeter without

of Graefe's method over Aubert-Förster's. Both furnish reliable, of course the same, results. Graefe's method is very convenient for the determination of a contracted visual field, but is deficient for determining fields of normal or inconsiderably reduced extent. No blackboard is large enough to receive the temporal limit of a normal F, which is about 90°, its tangent therefore infinite. The tracings on a sphere have an inestimable advantage over those on a plane by furnishing figures proportionate to the area of the retina, while those on a plane do so only for a small space near the point of fixation, viz., so far as the tangent does not materially differ from the arc. Compare a valuable paper on this subject by Hirschberg in these ARCHIVES, vol. iv, p. 366. KNAPP.

¹ Aubert, "*Physiologie der Netzhaut*," Breslau, 1865.

² Can be procured from P. Dörfel, Berlin.

trouble, is self-evident, and a table of these angles is sufficient in case one does not wish the representation of the field.

If, however, the entire visual field is given, drawn on the board, the reader has, first, a clear and correct picture of its boundary, and he can, if he so desire, compute with ease the value of the angles, provided, as is usual, the distance of the fixing eye from the centre of the chart is also given.

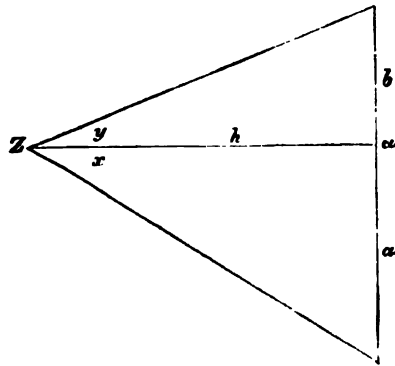


FIG. 1.

In Fig. 1¹ let Z represent the position of the eye, which is fixed on the centre of the chart α . Let h be the distance between these points, a and b the distances from the point of fixation to the boundary of the field of vision in one meridian, and x and y the corresponding angles. Then we have

$$\tan x = \frac{a}{h} \quad . \quad . \quad . \quad (1)$$

$$\tan y = \frac{b}{h} \quad . \quad . \quad . \quad (2)$$

Should one desire the value of the angle $x + y = z$, as, for example, in eccentric fixation, a simple formula suffices :

$$\tan Z = \frac{\sin Z}{\cos Z} = \frac{\sin x \cos y + \sin y \cos x}{\cos x \cos y - \sin x \sin y}$$

¹ Compare R. Hilbert, das Verhalten der Farbenblinden gegenüber den Erscheinungen der Fluoreszenz, Königsberg, 1882, page 53, Anm. 2.

Dividing the numerator and denominator of this fraction by $\cos x \cos y$, we obtain

$$\tan Z = \frac{\tan x + \tan y}{1 - \tan x \tan y} = \frac{\frac{a}{h} + \frac{b}{h}}{1 - \frac{ab}{h^2}}$$

Multiplying the numerator and denominator of this fraction by h^2 , we obtain

$$\tan Z = \frac{ah + bh}{h^2 - ab} = \frac{h(a + b)}{h^2 - ab} \quad (3)$$

Formulæ (1) and (2) can also be employed to construct a visual field on a chart from a given set of angles, or, which is the same thing, to convert one drawn on a perimetric chart into one drawn by central projection on the tangent plane passing through the pole of the perimeter.

But even in the most detailed perimetric determinations, and without a corresponding diagram, can the projection of every point be computed in any meridian.

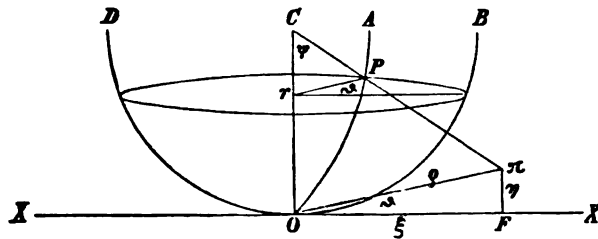


FIG. 2.

Fig. 2 represents a section through the perimeter and the tangent plane of projection passing through its pole. The plane of intersection passes through the pole O , and is perpendicular to the projection plane XX . Let P on the meridian AO be a point of the visual field to be projected on the plane XX . The line of projection passing through the centre C cuts the plane XX at π . The coördinates of π are to be found in terms of the known quantities, viz.: the radius of the perimeter r , the latitude ϕ , and the longitude θ , considering BO as the initial meridian.

Let O be the origin of the system of coördinates, XX the

axis of abscissas, the axis of ordinates a line perpendicular to XX at O , and in the plane of projection. Let the distance of the point π from the origin be ρ . Let fall a perpendicular πF from π on XX , then let the abscissa $OF = \xi$, and the ordinate $\pi F = \eta$. In the right-angled triangle $OF\pi$, ξ and η are easily determined.

$$\xi = \rho \cos \vartheta$$

$$\eta = \rho \sin \vartheta$$

The value of ρ is found in the right-angled triangle $OC\pi$

$$\rho = r \tan \psi$$

Substituting the value of ρ in the above equations, we obtain

$$\xi = r \tan \psi, \cos \vartheta \quad . \quad . \quad . \quad (4)$$

$$\eta = r \tan \psi, \sin \vartheta \quad . \quad . \quad . \quad (5)$$

To show the dissimilarity between the visual field mapped out on the board and that drawn upon a perimetric chart, I append the field of a male patient, fifty years old, suffering from atrophy of the optic nerve, whose right eye is already amaurotic. Fig. 3 represents the visual field of the left eye,

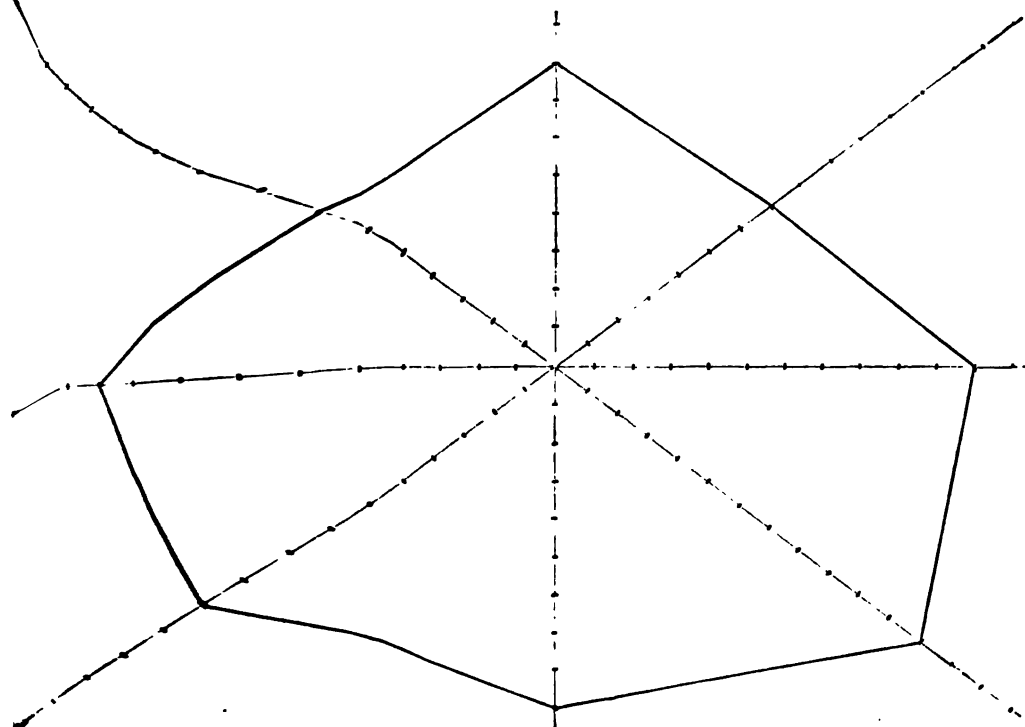


FIG. 3.

mapped out on the board. Fig. 4 shows the same as obtained with the perimeter.

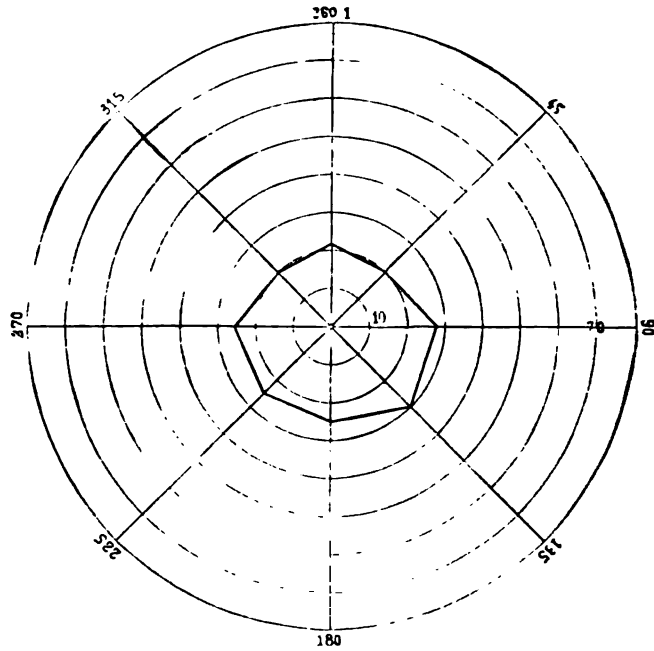


FIG. 4.

From the former, by means of formulæ (1) and (2), the angles corresponding to the different meridians were computed and entered on a perimetric chart. Fig. 5.

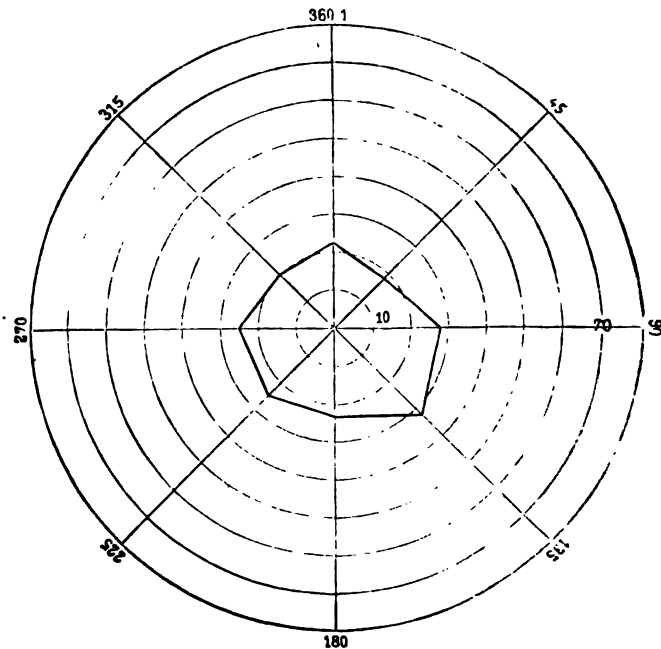


FIG. 5.

A comparison of figs. 4 and 5 shows plainly the marked agreement between the visual fields, the one determined by observation, the other by computation.

There is no object in making the optic papilla the centre of the field. The reason generally given for this displacement, that the papilla is usually regarded as the centre in ophthalmoscopic examinations, is not valid. In the ophthalmoscopic atlas of Jaeger, the best that ophthalmological literature possesses, we find the centre of the picture to be almost always the location of the macula lutea, while it is the optic papilla only in the few cases in which the disease is localized mainly in this situation. The macula lutea is certainly the physiological and natural centre of the field of vision. This serves as an answer to the question started by Förster¹ as to the representation of the visual field.

We can sum up the results of the above work as follows :

(1) Visual fields mapped out on the board are the most serviceable to practitioners.

(2) A perfectly correct representation of the configuration of the visual field is possible only when it is registered on the perimeter of Scherk.

(3) The visual fields entered on perimetric charts are distortions.

(4) The angles belonging to a visual field mapped out on the board are computed without difficulty.

(5) A visual field given by a list of its angles admits an easy construction of its surface-projection.

(6) The projection of the macula lutea should be the centre of the field of vision.

¹ Offener Brief an Herrn Professor Hirschberg, *Centralblatt für praktische Augenheilkunde*, 1883, Januarheft, pag. 31.

CHARACTER OF THE FOCAL LINES IN ASTIGMATISM.

By SWAN M. BURNETT, M.D., WASHINGTON,

PROFESSOR OF CLINICAL OPHTHALMOLOGY AND OTOLGY IN THE UNIVERSITY OF GEORGETOWN.

IT is common with writers on astigmatism to speak of the anterior and posterior focal *planes*, meaning by these the planes passing through the foci of the principal meridians. To the use of these terms no exceptions can be taken when they are limited in their application to the planes passing through the points mentioned. When, however, the focal planes are considered, as they undoubtedly are by many, as synonymous with planes passing through the focal *lines*, the terms are misapplied.

I think the error has arisen from experimental attempts to demonstrate the character of refraction by an asymmetrical surface. One of the simplest as well as the commonest of these methods is the combination of a cylindrical and a spherical lens. This, indeed, makes an astigmatic system, inasmuch as there is no place where all the rays emanating from any point are united after refraction; and in such experiments the anterior and posterior focal lines do correspond approximately with the planes passing through the foci of the meridians of the greatest and least refraction. This is so because the two principal meridians are regularly curved surfaces subject to only the ordinary amount of monochromatic aberration.

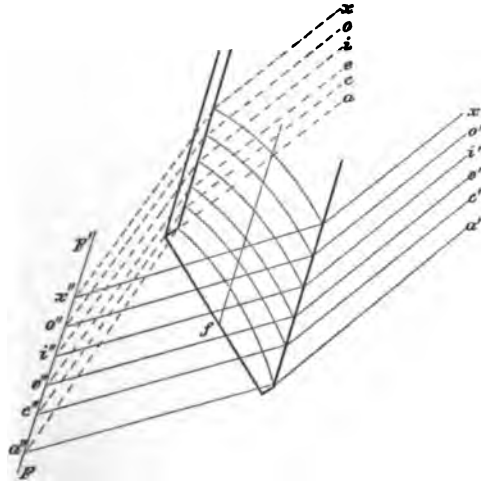


FIG. 1.

If the cylindrical lens acted alone we would have a series of foci on a right line parallel to the axis of the cylinder, as shown in Fig. 1. Each set of parallel rays $a a', c c',$ etc., are united after refraction, each in its own plane perpendicular to the axis of the cylinder f , at the points $a'', c'',$ etc., on the line $F F'$ parallel to the axis f . The rays passing through the cylinder parallel to f would of course suffer no refraction. When, however, a positive spherical lens is united to this cylinder, it has the effect of uniting those rays passing through the cylinder in planes parallel to its axis f , and of advancing the focal line $F F'$, forming the well-known focal interval of Sturm, bounded by the anterior and posterior focal lines. In this instance these lines are approximately *straight*, because the surfaces of both the cylinder and the spherical lens are regularly curved, and the difference between the refraction of the central and peripheral meridians is expressed by the usual amount of spherical aberration. That is to say, there would be a slight curving of the focal lines; their concavity being toward the refracting surfaces.

The conditions are by no means the same when we come to deal with an ellipsoid of three unequal axes, such as is represented by the cornea in regular astigmatism. Here each of the meridians is not a regularly curved surface, but a surface which changes its curve at each successive point. No

such lenses, so far as my knowledge extends, have been used in making these experiments.

It is very easy, however, to picture in the mind's eye the conditions we should have in refraction by such a surface. We can suppose, as Dr. W. C. Ayres suggests,¹ that the ellipsoid is cut into a series of adjacent planes parallel to one of the principal meridians. Each of these planes will then represent, as does the principal meridian to which it is parallel, an ellipse. This is shown in *V*, Fig. 2, where the ellipsoid is supposed to be cut into a series—1, 2, 3, 4, 5, 6, etc.—of ellipses parallel to the principal vertical meridian *va v'*.

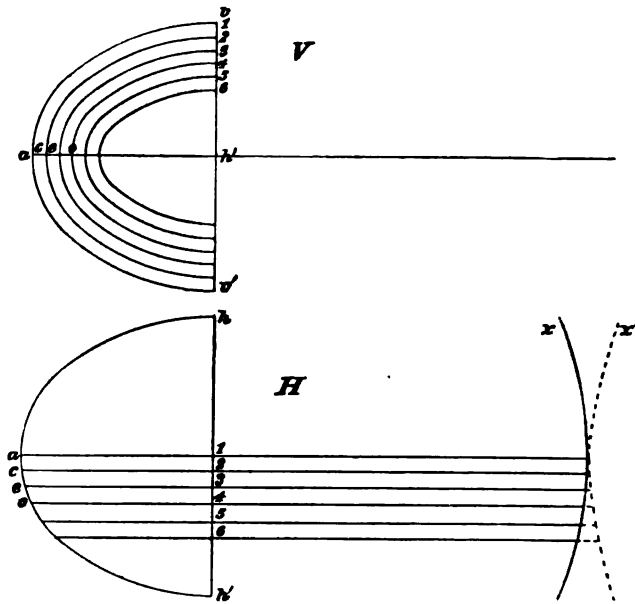


FIG. 2.

It must be evident, when we consider the form and the relations of these ellipses to each other, that there will have to be a wonderful combination of happy circumstances if we are to have the foci of rays refracted by all to lie in the same vertical plane.

That the foci all lie in the same *horizontal* plane is certain, because the apices of the ellipses, *c*, *e*, *o*, (which are

¹ *N. Y. Med. Journ.*, Nov., 1881.

the principal points of the refracting surfaces,) all lie in the same plane $a h'$, as the apex a of the ellipse 1, which represents the principal meridian with which they are parallel; and since all the cardinal points must lie in the same plane the foci must be found somewhere on the prolongation of the plane passing through $a h'$.

But it is also very evident that the principal points do not lie in the same *vertical* plane, for the apices, a, c, e, o , of the several ellipses, 1, 2, 3, etc., form part of a curved line which constitutes the ellipse representing the horizontal principal meridian, $h h'$, at right angles to the principal vertical meridian to which they are parallel, as shown in H , Fig. 2.

Now, the position of the focus of any one of these ellipses in relation to the focus of the principal meridian depends upon two things: first, upon the radius of its curvature as compared to that of the principal meridian; and secondly, upon the position of its principal point (from which its focal distance is measured) as compared with that of the principal meridian. These relations, again, depend upon the relations which exist between the three axes of the ellipsoid. Thus, the curve of the horizontal meridian $h h'$ in H , Fig. 2, formed by the principal points, a, c, e, o , etc., of the vertical ellipses, will depend upon the relation of the antero-posterior axis to the horizontal axis, whereas the curvature of the ellipses themselves, on which their foci depend, will be governed by the relation between the antero-posterior and the vertical axis.

Let us take, as an example to illustrate our meaning, the case where rays fall on the sharper end of the ellipsoid, or in the direction of the major axis, and let us assume that the vertical meridian is the more strongly curved, and that the ellipsoid is divided into a series of ellipses parallel to the vertical meridian. It is apparent that these ellipses become constantly smaller, with shorter radii of curvature, as they pass toward the periphery from the principal meridian, for they finally disappear as a point at the apex h' of the ellipse on the blunter end of the ellipsoid. The effect of this would, of course, be a constant shortening of the foci. But

at the same time there is a constant recession of the principal points, c , e , o , from the principal plane of the principal vertical meridian passing through a , with, of course, a concomitant recession of the foci.

Now, if we can have such a nice adjustment of the three axes that these two conditions shall neutralize each other, the line formed by the focal points of the series of ellipses will be a right line, falling in a vertical plane passing through the principal focus of the principal vertical meridian. There is, therefore, *one* possible form of ellipsoid, and only one, in which the focal line of one of its meridians will be a straight line and lie in the plane passing through the focus of the vertical meridian. Whenever there is any deviation from this form of ellipsoid, the focal line will no longer be straight, but curved, and the direction of its curvature will depend on the predominating influence of the one or the other of the above-named factors. If the relation between the major and the horizontal axis is such as to cause the setting back of the principal points to be the more powerful, then the curve would be backward, as shown in x' , Fig. 2; should the relation of the axes be such that the shortening of the foci would be in excess, then the curve would be in the opposite direction, or forward, as shown in x . It follows, also, from what has been demonstrated, that in no triaxial ellipsoid can such a relation between the axes exist as to cause *both* the focal lines to be straight; for, as we have seen, there is only one relation of the ellipses that can bring about such a result, and as from the very nature of the figure the ellipses in the two meridians must be different, if one has this form the other cannot have it.

I was in hopes to be able to present some general formula which would apply to all forms of ellipsoids, but my mathematical friends to whom I broached the subject have assured me that such a thing is impossible. It will be necessary to treat every form of ellipsoid (of which there is an almost infinite number) separately, and as the task is a tedious and by no means an enviable one, it would hardly be worth while to undertake it unless for some special case.

**LARGE TUBERCULAR TUMOR OF THE CHOROID.
ENUCLEATION OF THE EYE; RECURRENCE OF
ULCERATION IN THE CONJUNCTIVA AND LID;
DEATH FROM TUBERCULOSIS OF THE LUNGS.**

By SWAN M. BURNETT, M.D., WASHINGTON.

OPHTHALMIC AND AURAL SURGEON TO THE CENTRAL DISPENSARY.

IN 1858 Manz published a case which for the first time established beyond peradventure the occurrence of tubercle in the human eye. Since then ophthalmological literature has contained occasional reports of cases of what was supposed to be tubercle found in various parts of the organ. Quite recently the subject has been studied from the standpoint of general pathology, and a large number of experiments have been made for the purpose of demonstrating the inoculability on the part of the eye of tuberculous material. The question still at issue is more as to the microscopical character of tubercle, and as to whether it has any distinct histological aspects. Under these circumstances, it seems to me that it would now be in order to study these supposed tubercular tumors in connection with their clinical history and the general course of tuberculous disease as we find it manifested in other organs of the body.

It is for the purpose of adding my mite to this study that I communicate the notes of the following case.

Annie Neal, a mulatto girl, tall, but of rather frail appearance, just turned into her thirteenth year, applied for relief of a trouble in the right eye at my service at the Central Dispensary, on the 7th of April, 1882. The only history I was enabled to elicit at that time was, that six weeks ago she had a very severe pain in the face, accompanied by a redness of the right eye. The pain had

quite subsided, but the inflammatory appearances had persisted, and steadily got worse. At that time there was a circumscribed swelling, of the same diameter as the cornea, on the outer side of the ball. Its anterior border was removed about six *mm.* from the base of the cornea ; there was some ulceration at the apex. The pupil was dilated *ad maximum*, and there was a uniformly grayish reflex from the interior of the eye. Cornea and lens clear. The conjunctiva was chemotic. No perception of light. Not having any doubt as to the presence of some form of intra-ocular growth, I at once took her into the house, and removed the eye, carefully taking away all of the conjunctiva which seemed to be implicated.

The healing was prompt and rapid, and in the course of a week the conjunctiva was smooth and secreting only a small quantity of muco-pus. On the 5th of May, when she presented herself after an absence of some weeks, there was found a large glandular swelling in front of the right ear, and under the angle of the jaw. It was hard and nodular, but painless. In course of time it became soft, and on the 11th of August I opened it and let out a quantity of thick pus. It continued to discharge more or less for two months, when it healed, but the cervical glands on that side continued enlarged and indurated until death. At the end of about two months, some slight changes were observed in the condition of the conjunctiva of the orbit. It lost its smooth appearance, and looked more granular than before ; still there were no clearly defined nodules, nor any points of ulceration. When she reported on the 6th of October, however, an ulcer was found along the inner margin of the upper lid. It was about one *cm.* in length and six *mm.* in breadth, extending back into the conjunctiva of the lid ; its bottom was granular.

The granular appearance of the conjunctiva had increased, and there was an apparent loss of its substance at the apex of the orbit. On the 27th of October there was an evident increase in the size of the ulcer, and it extended backward for some distance into the conjunctiva of the lid, which at that part was elevated into a circumscribed swelling, into which the ulceration extended. The loss of substance at the apex had also become greater, reaching forward as narrow, deep furrows. These conditions of the conjunctiva remained unchanged until death. There was no perceptible increase in the extent of the ulceration, nor was there any tendency manifested to heal.

At the time of the enucleation of the eye there were no general

symptoms which could direct the attention to tubercular affection in any organ. The general health of the girl appeared to be good, and the history of the eye-trouble suggested either a glioma of the retina or a sarcoma of the choroid. The enucleated globe was placed in Müller's fluid for examination at a future time. On the appearance of the swelling of the pre-auricular glands, however, I began to suspect a scrofulous or tuberculous affection, which might turn out at least a complication, even if the ocular tumor was not found to be tubercular in character. I therefore made an examination of the lungs, and found, I thought, marked dulness on percussion under the left clavicle, jerky respiration and bronchial breathing. There was no cough, and the nutrition seemed to be good. The patient was examined by several gentlemen at the Medical Society of the District of Columbia, before which she was exhibited, and opinions were divided as to the diagnosis of tubercle of the lungs based on the physical signs. The further clinical history of the case is unfortunately brief. She soon began to decline in strength, to lose flesh, a cough set in, and there was increase of temperature. All these symptoms gradually increased in intensity, and she died on the 2d of March, 1883, under the same conditions as all those who die of rapid consumption. An attempt was made to obtain a post-mortem examination, but unfortunately it failed.

An inquiry into the family history revealed the fact that she was the eighth child of the family who had died with affections (probably tubercular) of the lungs or bowels, she living the longest of any. Her father died of consumption, as did also several members of his family.

EXAMINATION OF THE TUMOR.

A section of the eyeball showed a total detachment of the retina; at no points was it in contact with the other structures, except at the optic-nerve entrance and ora serrata. From the choroid there sprang a growth which extended from around the optic-nerve entrance forward, reaching on the outer side to near the ora serrata. Its anterior limit on the inner side was somewhat short of this, and was still shorter superiorly and inferiorly. The mass seemed to surround the optic-nerve entrance rather than to spring from the nerve itself. On the outer side a large nodule arose

abruptly to the height of about $\frac{1}{4}$ of a *cm.* from the level of the sclera. It then descended somewhat abruptly again to a thickness of $\frac{1}{4}$ *cm.*, and, spreading out, continued so to within a short distance of the ora serrata, where it thinned rapidly and merged into the surrounding tissue. There was another nodule, smaller, on the inner side of the nerve, and several others still smaller, which seemed to be only a circumscribed elevation of the general thickening. On section, these nodules and the thickening were yellowish, but not homogeneous in structure, having streaks of harder material in softer. One of the nodules, which corresponded to the external tumor, when cut into, was found filled with a broken-down fluid material. The largest nodule near the optic nerve was firmer in consistency. The interior of the general thickening was granular when the hardened specimen was cut into, and the two walls were easily separated.

The general relation of the parts is shown in the accompanying diagram.

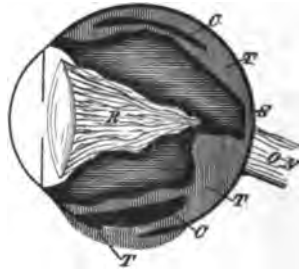


FIG. I.

O N, optic nerve; R, detached retina; S, sclerotic; T T T, tumor; C C, cavities in tumor.

Histologically, the growth consists of a groundwork of small round cells with nuclei, and a small quantity of connective-tissue substance, which would be at once recognized as granulation tissue. These cells were well stained by hæmatoxylin. Scattered through this, at irregular intervals, was another substance, which corresponds to the appearances of the so-called giant-cell. These giant-cells varied greatly in size and in contents. As a rule they were well filled with nuclei, which took usually a much lighter

staining than the cells of the stroma. Aside from these nuclei, they contained a substance which took no staining, but remained of a yellowish tinge. In some it was quite hyaline in appearance, *d, e*, but in others it was evidently degenerated cellular tissue, *a, b, c*. Besides these clearly-defined



FIG. 2.

a, b, c, Giant-cell filled with granular material; *e, d*, giant-cells with hyaline contents; *g*, giant-cell filled with nuclei; *i*, irregular space filled with granular matter.

cells, mostly oval in shape, there were other areas, often of great extent and of irregular outline, which were filled with this unstained granular material *i*. There was no pigment in the substance of the growth anywhere except in the immediate vicinity of the choroid, which was almost completely disorganized, though the hexagonal cells were often found intact as a layer for some distance on the surface of the tumor seeming to show that the growth had been more toward the sclera than toward the retina; and macroscopically, the pigment layer was to be seen covering the growth at all parts except over the very large nodule near the optic nerve. A section through this discovered a streak of pigment through its centre, corresponding in direction to that of the choroid. Sections of the optic nerve showed it to be unaffected. The cavities in the growth contained round nucleated cells, with a trace of connective tissue and a quantity of broken-down, unstained substance, most probably degenerated cells. Everywhere there was a manifest

tendency to invade the sclerotic, particularly in the vicinity of the vasa vorticosa; and for some distance away from the tumor-substance the nuclei around these vessels in the sclera were largely increased in number. No attempt was made to discover the tubercular bacillus.

REMARKS.

In regard to the histological structure of tubercle, opinion seems not to be definitely settled. In fact, it can hardly be said that at this time we have any one characteristic microscopical appearance which marks a growth as tubercular, though the time has been when authorities were very positive on this question. Laennec regarded the caseous matter as pathognomonic; Lebert looked upon the shrunken cell as essential; and Virchow considered a tuberculous character indicated when there was the elementary grayish tubercle, a conglomeration of round lymphatic cells with a tendency to necrobiosis.

Some recent investigators, among whom are Wagner, Schüppel and Friedländer, have insisted on the giant-cell as peculiar to the tuberculous growth.

The histological type of tubercle they consider to be one or more giant-cells surrounded with larger many-nucleated cells and smaller lymphoid cells embedded in a net-work of cells with variously formed processes—endothelioid—and with an infiltration for some distance of small round cells.

It is now, however, universally admitted that these giant-cells are found in other pathological products, such as lupus, syphilis, and even granulation tissue.¹

So firmly is this want of confidence in an essential histological character impressed upon Cohnheim, that he insists on inoculation of animals as the only absolute proof of the tuberculous nature of a morbid product. If it produce tubercle the character of the growth is at once settled.

In this unsettled state of opinion clinical observation becomes of great value. If, in connection with a morbid growth, about the nature of which we are in doubt, we find

¹See Baumgärtner, Gräfe's Archiv, B. xxv, 3, p. 187.

clinical evidences of tubercular invasion of other portions of the body, we can then rationally infer that nature has performed the experiment of inoculation for us, and furnished us with the desired proof. It is in this connection that we consider the preceding case of interest. The general aspect of the patient, the early appearance of the dulness and bronchial breathing over the upper portion of the left lung, the glandular swelling before the right ear and under the angle of the jaw, the enlargement of the cervical glands, the ulceration of the conjunctiva appearing some time after the enucleation of the affected ball, and the whole course of the disease to her death, as well as the family history, all point to a tubercular cachexia.

I think, too, that there are some valuable diagnostic points in the microscopical appearance of the tumor itself. Tumors the size of this one in the interior of the eye are either gliomatous or sarcomatous, though certain forms of metastatic choroiditis sometimes offer analogous aspects.

In the last case there would be an antecedent history of an affection likely to lead to a metastatic process. In the case of either glioma or sarcoma, the tumor is more circumscribed and evidently takes its origin from one spot, while in tubercular tumors, besides the diffuse thickening of the choroid there is evidently more than one point from which the growth proceeds, and in the interior of the tumors as well as of the diffuse thickening there are areas of soft or even liquid degeneration, which we do not find in either the glioma or sarcoma. And I think that some suggestion of a tubercular growth would come from the ophthalmoscopic appearance. In glioma and sarcoma, both of which are more or less vascular, we have usually a red or yellow reflex from the pupil (amaurotic cat's eye), though where the sarcoma is very heavily pigmented this may be very slightly marked. In the tubercular tumor, which is only slightly if at all vascular, we should expect not a red or yellow but only a grayish reflex, as was the case in our patient.

Such large tubercular tumors of the choroid as we have described seem to be rare. Miliary tuberculosis of the choroid is rather common, and their discovery by means of

the ophthalmoscope is often the first indication of a general development of miliary tubercles manifest in other parts of the body ; but of such large confluent growths only a few are on record. The first one of which an accurate account is given is by Von Gräfe in the second volume of his *Archiv*, p. 210. It was in the eye of a pig, but its histological character, in the light of more modern investigation, leaves but little doubt of its being tuberculous. Another case is reported by Manfredi in the *Archives d' ophthalmologie*, tome 1, No. 1, p. 44 ; one by Poncet in *Gazette Médicale*, 1875, Nos. 7 and 8 ; one by Haab in *Gräfe's Archiv*, xxv, 4, p. 163 ; one by Gowers (examination by Nettleship) in his "Medical Ophthalmoscopy," 2d ed., p. 223 ; and one by Hirschberg in the *Transactions of Seventh Session of the International Medical Congress*, 1881 (ophthalmological part, p. 119).

It is pretty certain, however, that some of the intra-ocular tumors reported by some of the older writers were, from the histories of the cases, tubercular.

Since this paper was prepared for the press, I see in Hirschberg's *Centralblatt* for June, 1883, a notice of a case of chronic tuberculosis of the choroid reported by Dr. Hosch, and published in the *Correspondenzbl. f. Schweiz. Aertze*, March, 1883. It was a large confluent tumor springing from the posterior part of the choroid. Rabbits, which were inoculated in the anterior chamber with the broken-down material, developed gray tumors on the iris at the end of from 22 to 39 days. It is not stated whether the patient was affected with general tuberculosis.

One interesting point in our case, which I have not seen mentioned by others, is the ulceration on the lid and conjunctiva returning after a perfect healing of the enucleation wound. This would seem to point to a local inoculation, and should cause us to exercise the same care in a thorough cleansing of the orbit in the cases of supposed confluent tubercle as in glioma and sarcoma.

WOUND OF AN EYE BY A MISSILE FROM A CROSS-GUN ; ENUCLEATION FOR SYMPATHETIC IRRITATION ; REMARKABLE LESION IN THE IRIS ; CYST-LIKE COLLECTION OF FLUID.

By DAVID WEBSTER, M.D., New York.

(With one Wood-cut.)

Mrs. G. brought her son, twelve years of age, to Dr. C. R. Agnew for advice on April 30, 1883. She gave the following history : On the 6th of October, 1880, he and a schoolmate were shooting from a cross-gun together. Having broken their arrows they pulled ditch weeds,—“golden rod,”—which were dry, and used them instead. The boy’s playmate accidentally shot him in the eye with one of these missiles. The stick entered the cornea of the left eye. The sight was, as she believes, destroyed at once by the injury. His nervous system was so shocked that it was some weeks before he was able to be taken to New York for treatment. About the middle of November, 1880, he was taken to the New York Eye and Ear Infirmary, where he was placed under ether, and an exploratory operation performed, as the mother understood, but none of the stick was found in the eye. Her family physician, who was present at the operation, informed her that the original wound was reopened, and the eye explored through it ; also that “they thought the blow had caused a separation of the retina, and a dislocation of the lens.” The inflammatory reaction and pain following the operation passed off in about a month. For about two years thereafter, the blind eye was not troublesome, and was “perfect” in its external appearance. In October, 1882, his mother observed, while washing him, a small white spot in his pupil, and on watching this spot, she found that it gradually increased until it filled the whole pupil. No further change occurred until March, 1883, when the eye became red and painful without apparent cause, and the right eye began to sympathize, being painful on use, and sensitive to light.

Although the blind eye is now free from redness, the right eye

still suffers from sympathetic irritation. There is no special tenderness on pressure of either eye. The lens of the injured eye is opaque. The iris is adherent to the lens capsule at its pupillary border, and so arched forward as to make the anterior chamber very shallow, except over the pupil. Tension slightly increased. No perception of light. Right, Vision, $\frac{2}{8}$; Hm., $\frac{1}{4}$.

On May 3d, Dr. Agnew enucleated the eyeball, and, after soaking in Müller's fluid a sufficient length of time, it was examined by Dr. T. Mitchell Prudden, who kindly gave us the following report :

" June 19, '83.—The cornea is normal except at the periphery, where, in the vicinity of the blood-vessels, there is a slight infiltration with small spheroidal cells. The anterior chamber, which is very shallow by reason of the arching forward of the iris, contains a small quantity of homogeneous fluid. The iris is dense, its blood-vessels compressed, and pigmented cells are unevenly distributed through its substance. The uveal layer on either side of the pupil is separated from the rest of the iris by a *cyst-like collection of fluid* (1), which



extends from the border of the pupil back nearly to the ciliary body. The pupil is crossed by a thin, veil-like, organized membrane, consisting of stellate, fusiform, and spheroidal cells, with a very small amount of finely fibrillated intercellular substance. The separated uveal layer of the iris is closely attached, posteriorly, to the middle third of the lens, but in the peripheral segment is separated from it by fluid (2).

" Just within the anterior-lens capsule lies a thin membrane of connective tissue (3). The lens substance is more or less disintegrated throughout, being in many parts broken into irregular fibrils, in others thickly studded with spheroidal

cavities, and in others presenting large irregular cavities filled with globular and irregular-shaped masses of disintegrated lens substance.

"The fibres of the suspensory ligament and zonula are stretched and separated by fluid which contains pigmented and variously shaped cells.

"A narrow, dense, cyclitic membrane (4) passes across the eye close behind the lens.

"The ciliary body is flattened and its pigmented layer irregular by reason of the peeling off of the cells.

"The retina is completely detached, is œdematous in places, and has undergone, throughout, the proliferative and degenerative changes common in incipient atrophy of the bulb. The choroid is much flattened and partially atrophied."

It is believed that the separation of the uveal layer from the rest of the iris by a cyst-like collection of fluid, as shown in the drawing, is a rare lesion. Dr. Prudden considered it rare and interesting. I have looked through Dr. A. Alt's work and do not find it mentioned there. I have also ventured to interrogate Dr. Knapp, who replies that he thinks the lesion is quite rare.

In reference to the history of the case it may be proper to add that all symptoms of sympathetic irritation passed rapidly away after enucleation of the offending eye, and that the child wears an artificial eye with satisfaction.

A CASE OF RIGHT-SIDED HEMIANOPIA AND
NEURO-RETINITIS, CAUSED BY A GLIOSAR-
COMA IN THE LEFT OCCIPITAL LOBE.

BY DR. LUDWIG FANY, OF Breslau, Prussia.

(*With two Wood-cuts.*)

Translated by Dr. CHARLES ZIMMERMANN, of New York.

Mary Giehmann, of Altwasser, Germany, aged twenty-one years, the daughter of a sailor, was treated at my dispensary service since 6th of May, 1881, for impairment of sight, existing from the beginning of January, 1881. She was a tall, slender girl of anæmic appearance, giving the following history: Her parents, both living, are healthy. She has two older brothers, and a sister younger than herself (two having died when young), who are of good constitution and enjoy excellent health. When a child, she went through all diseases common to that age without any trouble. At the age of five years she was melancholic for a few days, in consequence of her father's absence for a fortnight. Her mental depression disappeared soon after his return. From her twelfth year she speaks somewhat through the nose. At the beginning this trouble was so pronounced that a tumor was suspected to develop in the nose. Her menses began at her fifteenth year. Two years ago she gave birth to a child, still living and quite healthy. The father of this child died about a year ago of a lung disease. After her delivery, she suffered for two months from serious rheumatic fever. Her present disease began suddenly with headache and vomiting here at Breslau, where she was a servant, in the last days of December. Therefore, at the beginning of January she left this place, and went to her parents at Altwasser, where she was treated by two physicians. A marked drowsiness, fretfulness, and vertigo, associated with headache, which was prevailing in the left occipital region. The vertigo was sometimes of such a degree that, when accidentally going through the room, she had to take hold of a chair or table to prevent herself

from falling down. At the very beginning of the disease, as soon as headache set in, she felt a peculiar paræsthesia in the right side of her face ; she experienced something like hot water running through her face. Then anæsthesia of the right side of her face appeared. She did not feel the pins with which her physician pricked her. Electricity was applied for some time. During January and February her speech was affected. She was able only to stammer, and sometimes could not utter a syllable. She says that finally both eyes came out from the orbits during the fits of headache and vomiting. Of late she observed this symptom only in the left eye. Besides that, she has now a sensation of heat and formication in the skin of the left side of her face, when headache comes on.¹

Status præsens.—Patient is moderately well nourished. Speaks through the nose, the latter being a little swollen at its root, but not tender upon pressure. The eyes look normal. No exophthalmus. L. E. : Barely counts fingers at about 8", only by excentric fixation. Field of vision very much contracted in its upper, lower, and outer portions. Absent altogether in its nasal half.

The examination with the perimeter was not possible. R. E. : M. $\frac{1}{8}$ S. = $\frac{1}{8}$. Temporal half of field of vision absent ; very much impaired upward, inward, and downward. (Perimeter upward, 25° ; inward, 22° ; downward, 18°.) The line of demarcation does not run through the point of fixation, but deviates somewhat in an outward direction in the upper half, at a distance of about 7° from the centre. O. L. E. : The whole disc is a dirty white ; pretty much swollen, especially in its central portion ; its lens being hazy and indistinct ; its outlines indistinct and steep, so that the ascending and descending vessels are somewhat bent at the edge. Disc has a more oval shape in the vertical direction. Retinal veins of normal size ; arteries attenuated ; no change in the remaining background. R. eye : Papilla also very much swollen, but not quite so white as the left ; rather whitish-gray and nearly round. Retinal arteries and veins are thicker than in the left eye ; no circumscribed anomaly visible in the whole background. It is to be mentioned that percussion of the head at the frontal, temporal, and occipital regions produces no pain, which in most cases is indicated by dis-

¹ Somewhat later, I learned, through the kindness of Dr. Adam, of Altwasser, who treated her from the 12th of January to the end of April, that the left eye showed choked disc, with a small degree of exophthalmus and a staring look, as early as the end of January. Disorder of intellect was noticed neither by him, nor by her relations.

tortion of the face. No trace of infection could be revealed by the most careful examination. The movements of both eyes, and the general sensibility and strength of the extremities, were normal. On tactile and thermic irritations, a certain dulness of sensation at some spots of the right side of the face was discovered. No mental disturbances could be noticed.

The first question, What brought about all the symptoms in this case? was evidently not difficult to be answered. No practitioner who is somewhat familiar with cerebral diseases will hesitate to make the diagnosis of cerebral tumor from the symptoms above mentioned: headache, vomiting, vertigo, mental depression, drowsiness, paræsthesia and anæsthesia, transitory disturbances of speech, associated with choked disc, neuro-retinitis, and finally hemianopia.

There was a second question more difficult to be answered: Where was the tumor located?

In regard to this, the hemianopia had to be considered as a guide. We know that headache, vomiting, choked disc, and neuro-retinitis are symptoms only of an intracranial increase of tension, and are of no particular value for the localization of a tumor cerebri. Three possibilities had to be taken into consideration on the basis of the semidecussation of the nerve-fibres in the chiasm, the existence of which is now fully established. (I refer to the newest excellent treatise upon that subject by Mauthner.¹) The tumor might be located at the basis cranii, or in the thalamus, or at the origin of the optic nerve, *i. e.*, in the occipital lobe. There was no symptom advocating the situation of the tumor at the base, *i. e.*, in the middle cranial cavity, no cerebral nerve situated near the optic tract being disturbed in its conductive power. Furthermore, it is not probable that a basal tumor could compress completely or destroy the left side of the chiasm, or the left optic tract, without irritating or paralyzing simultaneously one of the other cerebral nerves on that side.

Nothing supports the second possibility, that the interruption of conduction in the optic fibres was caused by a tumor

¹ "Gehirn und Auge," von Dr. Ludwig Mauthner. Vorträge aus dem Gesamtgebiet der Augenheilkunde, 6-8 Heft, Wiesbaden, 1881.

occupying the optic thalamus, unless the occasional vaso-motor symptoms (sudden flush and heat of the face, exophthalmus) are considered of great importance as to the presence of a tumor in the optic thalamus (according to Petrina).

The third possibility seemed to be the only plausible supposition, viz.: the existence of a tumor at the origin of the optic nerve. This was supported further by the absence of motor paralysis, and the pain which the patient felt in the occiput.

This latter fact is regarded by Pitres and Nothnagel as conclusive evidence. I derived great aid in the diagnosis from the incident literature, viz.: in the first place, the anatomo-pathological conditions of defects in the cortex of the occipital lobe, in cases of atrophy of the optic nerve, described by Huguenin; in the second place, the results of the post-mortem examinations in those three well-known cases of Curschmann, Westphal, and Jartrowitz. My opinion was, however, most strongly supported by the famous physiological discoveries of Munk,¹ who succeeded in producing contra-lateral hemianopia by experimental destruction of the occipital cortex. I left undecided the last question which could have been asked, viz.: whether the tumor occupied only the cortex, or extended also more or less to the subjacent layers of white substance.

I directed the patient to be careful, and in want of something better, I gave her the favorite iodide of potassium in small doses, and asked her to call again after some weeks.

May 31st.—Patient returned. Her condition is about the same. During the last days severe headache, accompanied by vomiting. I ordered a seton to be applied to her neck.

June 1st.—Free from headache, from which she suffered yesterday.

June 4th.—General health much better; no headache at all during the last days. Her sight has improved (S. = $\frac{1}{18}$).

June 8th.—Felt comfortable from 4th to 7th of June. At this day, in the afternoon, headache with chills set in again. Last

¹"Ueber die Function der Grosthirnrinde." *Gesammelte Mittheilungen aus den Jahren 1877-1880*, von Prof. Hermann Munk, Berlin, 1881.

night pretty good. To-day, at about nine o'clock A.M., headache, now prevailing in the left frontal region, was more intense, and vomiting occurred at intervals three times. The patient feels weak and exhausted, looks apathetic, and complains again of formication in the left side of her face. She has the sensation as if both eyes were coming out of the orbits. There is apparently a small degree of exophthalmus of the left eye, which is sensitive upon direct pressure. S. only $\frac{1}{4}$. On examination with the ophthalmoscope a change is noticed, in so far as now the right optic disc is also beginning to become white, and does not appear round, but pushed inward at its outer-lower margin (inv. image).

June 10th.—Yesterday and to-day, during the whole forenoon, headache and nausea; no vomiting. The pain is exclusively felt in the left occipital region; and the left half of her face and the left ear have been several times red and hot again.

June 11th.—At ten o'clock A.M. severe convulsions and loss of consciousness began, preceded early this morning by excruciating headache and constant vomiting. At two o'clock P.M. death occurred.

A post-mortem examination was not consented to at first, but after forty-six hours I received the permission to open the cranial cavity. The following report I owe to the kindness of Prof. Dr. Marchand, at that time first assistant at our pathological institution.

Cranium thin; a moderate quantity of blood in the longitudinal sinus. Dura mater unchanged; it adheres to the left occipital lobe only in one place, which represents an almost hemispherical prominence above the level of the neighborhood, about 3 cm. in diameter (*a*, figs. 1 and 2). At the corresponding part of the skull, immediately above and to the left side of the eminentia arcuata, there is a smooth depression exactly corresponding to that prominence, and of the same diameter. It penetrates the whole substance of the bone, so that a triangular defect is noticeable, 1 cm. in height and 1 cm. in width, only covered by a thin membrane. The whole region of the bone is convex at the outer surface. The lambdoid suture passes through the middle of this prominence. It has an ossiculum Wormianum right at the place of the defect, so that this defect is partly bordered by the suture. The surface of both cerebral hemispheres is considerably

flattened, the furrows not marked, the larger veins moderately filled, and the small ramifications uniformly congested, especially those of the right hemisphere. The posterior portion of the

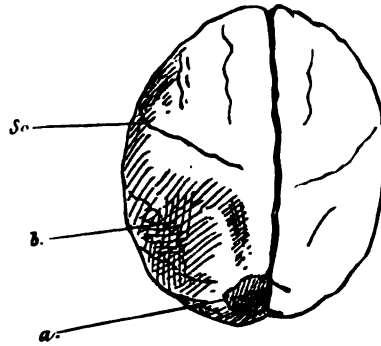


FIG. 1.

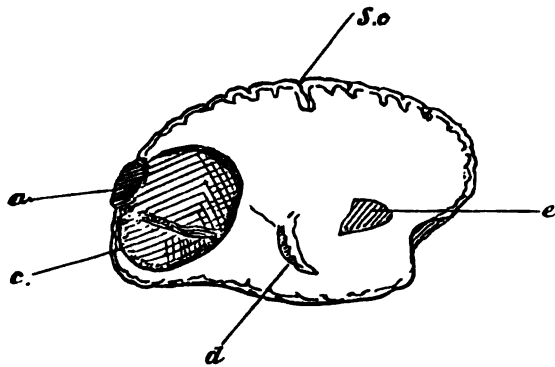


FIG. 2.

left hemisphere shows, besides the prominence mentioned above, a considerable depression (*b*, fig. 1), which occupies the posterior portion of the parietal lobe and the whole occipital lobe. This depression was brought about by evacuating several tablespoonfuls of a clear yellowish fluid when the brain was taken out. The depressed portion, not sharply defined, extends forward to the vicinity of the posterior central gyrus. The whole segment of the hemisphere behind it gives the feel as of a loose bag, and is somewhat denser at the smooth medial surface. The depression can be noticed also at the lower surface of the occipital and temporal lobes. The anterior half of the latter is of the same shape and consistence as on the right side. The above-mentioned prominence of the left occipital lobe is mostly of a reddish

yellow color, of soft consistence, with a smooth surface. It belongs only to the convexity, occupying exactly the apex of the occipital lobe. Small vessels run over it; some larger ones pass along the margin, identical to those of the pia mater. The tumor extends forward close to the parieto-occipital sulcus and its continuation at the convexity. The posterior margin of the parietal lobe can easily be raised from it. Medially, the tumor is firmly connected with the pia mater, shows a pale gray color, somewhat transparent, and seems partially to adhere to the cerebral substance. The adhesion of the dura mater, just mentioned, is confined to a district of 2 *cm.* in diameter. The dura itself is not changed there.

A sagittal section of the hemisphere, through the middle of the tumor (fig. 2), shows immediately below the latter a very large cavity surrounded by a completely smooth and transparent membrane of a pale-yellowish color, in which a number of small vessels run. The cyst has a diameter of 8 *cm.* in length and 8 *cm.* in width. It extends from the apex of the occipital lobe near the descending cornu, at a distance of about 4-5 *cm.* from the central gyrus. From the lower wall of the cyst starts a membranous cord, about 8 *cm.* long and 1½ *cm.* broad, in general of the same character as the remaining wall, apparently attached to the region of the external tumor, and passing through the cyst like a bridge. A connection with the ventricle or the plexus cannot be observed, and, besides the cyst, no remainder of the posterior horn can be found. The delicate wall of the cyst can be very easily separated from the soft cerebral substance, which shows no fatty degeneration or yellow softening. The brain-substance between the wall of the cyst and the base of the occipital and temporal lobes is only 1 *cm.* thick; at the external circumference of the convexity it is reduced to a few millimetres. The size of the cyst, when filled, may have been that of an orange.

At the external prominence the wall is occupied by a tumor, which is about 2 *cm.* thick, soft, pale, of a reddish and somewhat transparent gray. It contains many yellow patches, and is softened in its interior. About in the centre of this tumor there is a large dark-red and soft node about the size of a hazel-nut, dissolving into a large quantity of vascular villi connected with each other by a loose neoplastic substance. The remainder of the tumor is also very vascular. The border of the neoplasm passes into the cerebral substance without a distinct boundary.

The whole brain is very soft, contains a moderate quantity of blood, and is macerated partially in the neighborhood of the ventricle. The ventricles are not enlarged. Circumscribed changes are nowhere visible except those mentioned before. We state expressly that the great ganglia: thalamus opticus, corpus striatum, nucleus lenticularis, chiasma, optic tracts, are without any alteration.

On examination with the microscope the soft neoplastic tissue is formed by round and oval cells embedded in a scant, finely granulated substance. At places the round, at others the oval, elements are prevailing. Between the smaller cells there are larger and multi-nucleated cells strewn about. Frequently the oval elements are very large; have long, more or less slender or ribbon-shaped, processes, looking like axis-cylinders, the cells themselves having the form of ganglia. The oval cells are closely connected with the vessels, which are surrounded by a dense layer of spindle-shaped cells. This becomes clear after their isolation by teasing and similar manipulations. The vessels show frequently varicose enlargements well filled with blood. They are most marked at the dark-red convolution mentioned above. The inner wall of the cyst has no epithelium. The soft, gelatinous cyst-wall, from 1 to 2 mm. thick, consists of similar, but mostly shorter and thinner, with spindle-shaped nucleated, enlargements. The tumor is therefore a soft *gliosarcoma*. It is most probable that it started from the interior of the occipital lobe, in the vicinity of the posterior cornu, perhaps from the ependyma, and grew gradually to the surface. The broad, longitudinally folded band which passed through the cyst was denser than the inner lining of the cavity. It was fibrillated like thickened ependyma, representing perhaps a remainder of the ependyma of the posterior cornu. It cannot be ascertained whether the cyst was originally connected with the cavity of the occipital horn, or was produced only by softening of the substance of the tumor. But the former supposition is more probable on account of the clear watery character of the fluid. Nearly the whole medullary substance of the occipital lobe and the posterior portion of the medullary layer of the parietal lobe were destroyed by the cyst. The external flattening, of course, does not correspond to the real extension of the cyst, the anterior wall remaining from 1 to 2 cm. distant from the descending cornu of the lateral ventricle. The gray cortex is replaced by tumor-substance only as far as mentioned above.

In conclusion, I have to remark that this case is similar to the three cases of Curschmann, Westphal, and Jastrowitz, before alluded to, concerning their importance as to the explanation of hemianopia. Our case is interesting for the reason that the cerebral tumor, having existed probably for years, remained perfectly latent for so long a time; further, that besides the hemianopia no additional symptoms of a circumscribed disease in the brain developed until the fatal issue, similar to Curschmann's case. Our case may therefore be considered as furnishing conclusive evidence for the location of the visual centre in the occipital lobe also in man.

In the literature at my disposal about tumors of the brain, I find only one similar observation, and this is in Virchow's "Oncology," vol. ii, p. 144. It refers to a man suffering from convulsions, mostly in the left extremities, now and then extending to the right side, for seven years, who finally showed symptoms of lunacy. The post-mortem examination revealed a glioma of the right occipital lobe the size of a large apple. A cavity in its interior, with rough, uneven walls, was filled with about four ounces of a dark fluid. Unfortunately, nothing was noted about the condition of the eyes during life, but it may be assumed, from the analogy with our case, that hemianopia existed, but was overlooked.

To avoid any misconception, I will state that by the heading of this paper, "Hemianopia and Neuro-retinitis," I did not intend to decide upon the priority of either symptom. I have described the succession of the two symptoms in such a manner as they revealed themselves by the clinical history and the examination. According to this, the neuro-retinitis would have been previous to the hemianopia; but it is quite possible that the hemianopia preceded the neuro-retinitis.

THE EYE-DISTURBANCES IN TABES DORSALIS.

By LUDWIG SCHMEICHLER,
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(See *figs. 1-5, plate ix.*)

Translated by Dr. N. E. BRILL, New York.

THE various disturbances which affect the eye in locomotor ataxia have, in the last few years, been made the subject of many treatises, both by ophthalmologists and neurologists. If it is undertaken to treat of this subject once more in the present paper, it is because, as the question of the curability of tabes has come again into prominence, the eye-symptoms of this disorder claim renewed attention, inasmuch as the disturbances of the visual apparatus are almost always initial symptoms,—and of these the most marked objectively.

In this communication it will be attempted to give a survey of what is known, and to add and apply new observations and reasonings. The clinical material was obtained during a long period of study in the eye-clinic of Prof. Arlt, in the fourth medical division of the hospital, whose inmates are in part sufferers from nervous disorders, and in the Home for Incurables. In the eye-clinic, tabes was studied in its beginning; in the medical division mentioned, in its progress; and in the Home, in its last stages.

The changes in the eye comprise those of the optic nerve, of the pupil, and of the eye muscles.

I. DISEASE OF THE OPTIC NERVE.—Atrophy of the optic nerve is a frequent and early symptom of tabes; this is, however, not recognized by all ophthalmologists and

neurologists. In the latter case it is because they see tabetic patients with commencing optic-nerve atrophy more rarely, the patient being sent to them only after other positive nervous disturbances have appeared. Should the patient, however, consult an ophthalmologist on account of his optic-nerve disorder, he will, when asked whether he has any other complaint to make aside from his visual impairment, usually give a decided negative answer. The ophthalmologist who contents himself with this answer will then conclude that "the importance of optic-nerve atrophy as an early criterion of tabes has been exaggerated" Förster (1).

If the tendon reflexes, however, are tested, the knee-phenomenon will be found absent; the patient is now pressed to tell whether he ever has had rheumatic pains, and he will then give—although, perhaps, only after prolonged questioning—a definite description of the lancinating pains, which the majority of them commonly attribute to changes in the weather. Beginning atrophy with fully developed and advanced posterior spinal sclerosis (that is, with completely developed ataxia) was not observed; there are, however, cases where the first lancinating pains appeared years after the development of the optic-nerve atrophy.

Erb (23) calculates that 12 per cent., and Möli (17) that 13.5 per cent., of all cases of tabes have optic-nerve atrophy. I have carefully examined for tabes all patients who came to the eye-clinic with beginning optic-nerve atrophy, and, aggregated with the cases observed elsewhere,¹ yielded a percentage of 40.

Before I proceed to a consideration of the functional disturbances, I may be permitted to relate a few histories of patients to which I shall have to refer later on.

CASE 1.²—Ignatz P., merchant, asserts that previous to an amblyopia, which appeared five months before, he was healthy; it

¹ In the Home for Incurables and the fourth medical division of the general hospital.

² Y., years; V., visual power; Jg., Jaeger's test-types; mot., motility; L. E., left eye; R. E., right eye.

soon was discovered that the patient had lancinating pains for five years and suffered occasionally with headaches. Medium build; pupils $3\frac{1}{2}$ mm. in diameter, reflectively immovable; levator palpebræ of both sides parietic; other eye-muscles normal; optic-nerve atrophy of both eyes; vessels normal in calibre; L. E., fingers directly at eye; R. E., fingers at 20 cm., recognizes no color but blue; mot. and sensibility normal; knee-phenomenon absent; little ataxia.

CASE 2.—Marie M., thirty-seven years old, dress-maker, married for fifteen years; three healthy children; no miscarriages. Has had lancinating pains and paræsthesiæ in lower extremities for one year, slight fatigue in walking for two years, and during last four months, amblyopia and incontinence of urine. Slender physique; mot. and sensibility normal; knee-phenomenon absent.

R. Pupil 5 mm. } Iridoplegia reflectica, optic-nerve atrophy of
L. Pupil 3 mm. } both eyes, slight convergence reaction; vessels
normal in calibre.

Feb. 26, 1882.—R. E., fingers at 6 m.; 2.25 D., V. $\frac{1}{8}$, Jg. 6.

L. E., V. $\frac{1}{8}$, Jg. 19. concentric limitation of visual field.

June 8, 1882.—R. E., V. $\frac{1}{8}$; L. E., fingers directly at eye.

Nov. 16, 1882.—R. E., fingers at 20 cm.; L. E., appreciates light at 6 m.; projection only above and to the outside.

Jan. 3, 1883.—R. E. { Quantitative perception of light; the ar-
L. E. { teries remained unchanged as long as he
was under observation; the veins on left
side appeared to be larger.

March 11, 1883.—Only slight appreciation of light remaining on either side; the veins of left side, especially those below, markedly dilated.

March 31, 1883.—Condition same as on March 11, '83.

CASE 3.—Charles L., sixty years, saw-maker. Lancinating pains for fourteen years; for several years paræsthesiæ of lower extremities; diplopia for fourteen years; amblyopia for thirteen years; for ten years, bowel and bladder difficulties; for five years, inability to walk. Strong physique; sensibility and mot. normal; knee-phenomenon absent; ataxia in highest degree. Pupils: L. E., 4 mm.; R. E., 5 mm.; do not react. Optic-nerve atrophy of both eyes; papillæ seem diminished in size; vessels contracted.

CASE 4.—Michael Ohngemach, fifty-five years, shepherd. Patient came into hospital in very destitute condition; history de-

fective ; walked badly for five years, and during last year could not walk at all ; bladder disturbances for many years, which have become acute in the last months ; blind for four and a half years. Patient marasmic ; paraplegia of lower extremities ; urine purulent ; knee-phenomenon absent ; iridoplegia of both sides ; pupils 7 mm. ; left ptosis, double optic-nerve atrophy ; vessels somewhat diminished in size. The autopsy (Prof. Kundrat) demonstrated, in addition to general marasmus, cystitis diphtherit. and other pathological changes in the viscera : "degeneratio grisea funiculorum posteriorum et œdema medullæ spinalis præcipue partis lumbalis, atrophia nervorum opticorum et tractuum." The tracts were changed to thin ribbon-like bands ; the microscopical examination of the nerves demonstrated that nothing was left of their nerve-fibres.

CASE 5.—Franz Kraus, forty years. Extract of the patient's history of November 12, 1880 : For three years had undergone heavy bodily exertions ; had lancinating pains and paræsthesiæ in lower extremities for three years, frequent girdle sensation and *crises gastriques* for one year ; during the last months disturbances in defecation and urination, discoloration of optic nerves of both sides, some atrophy of the muscles of the lower extremities, knee-phenomenon absent.

Dec. 2, 1882.—Patient has become an opium-eater ; complains of persistent pains in the lower extremities ; great atrophy of both lower extremities ; great diminution of motility ; sensibility much weakened. Pupils do not react ; R., 6 mm. ; L., somewhat smaller ; double optic-nerve atrophy ; L., quantitative appreciation of light ; R., amaurosis ; vessels somewhat diminished in calibre. The autopsy (Prof. Kundrat) showed "gray discoloration of the column of Burdach in the med. obl., degeneratio grisea funicul. medullæ spin. (tab. dors.)." The optic tracts were diminished in size on transverse section ; the microscopical examination confirmed the diagnosis of spinal-cord disease ; in the left optic only a few intact nerve-bundles can here and there be found.

CASE 6.—Chas. Wr., forty-three years, laborer. Lancinating pains and paræsthesiæ in lower extremities for one year ; bowel and bladder difficulty for ten months ; amblyopia for six months ; strong physique ; motility and sensibility normal ; tendon reflexes absent ; pretty extensive ataxia. Pupils 4 mm. in diameter, reflectively immovable ; atrophy of both optic nerves ; vessels normal ; right quantitative appreciation of light ; left V. $\frac{1}{4}$; can not distinguish green (fig. 5).

CASE 7.—Theresia L., forty-four years. Hemicrania for six years, which has diminished appreciably in the last few months; lancinating pains and paræsthesiæ in lower extremities for four years; during last few months bowel and bladder difficulties; for three weeks amblyopia especially of R. E.; patient sees better in the evening. Very strongly built; sensibility and motility normal; tendon reflexes absent; very little ataxia. Pupils reflectically immovable; R. $3\frac{1}{2}$ mm., L. $2\frac{1}{2}$ mm.; double optic-nerve atrophy.

March 16th.—R. E. = 0.50 D., V. $\frac{1}{8}$; +2.50, Jg. 5; only recognizes blue (fig. 3). L. E., V. $\frac{3}{8}$; +2.50 D., Jg. 1; recognizes all colors.

May 16th.—R. E. = fingers at 3 m.; L. E. = $\frac{3}{8}$; Jg. 2.

CASE 8.—Joseph Schm., thirty-three years, clerk. Ten years ago had ulcer and bubo without secondary symptoms; lancinating pains for four years, cramps in intestines and stomach (crises gastriques) for three years, paræsthesiæ in lower extremities for two years, bladder difficulty for three years; two years ago had diplopia with subsequent strabismus, which disappeared of itself in a few months; vision is blurred for more than one year, and for several months the patient became easily fatigued by walking; girdle sensation for five months, impotence for four months; has two healthy children. Tolerably strong physique; motility and sensibility normal; knee-phenomenon absent; evident ataxia. Pupils: R. 4 mm., L. 3 mm.; L., slight paresis of the rectus externus; double optic-nerve atrophy. R. E., fingers at 3 m.; insensitive to green; diminished sensibility for red (fig. 2). L. E., quantitative perception of light.

CASE 9.—Anton O., thirty-eight years, servant. Lancinating pains and paræsthesiæ for three years; for two years arthropathy of right knee (arthropathie des ataxiques); motility normal; sensibility of lower extremities diminished; tendon-reflexes absent; little ataxia; amblyopia for one year. Pupils, 4 mm.; R., minimum reaction to light; L., iridoplegia reflectica; double optic-nerve atrophy.

<i>Oct. 1st.</i> —L. E., fingers at $1\frac{1}{2}$ m.; distinguishes yellow and blue.	} Concentric limitation of visual field. ¹ Vessels normal.
R. E., fingers at 30 cm.; appreciates only blue.	

¹ The visual fields which were taken on March 13, 1882, are entirely normal, but unfortunately their corresponding visual tests have been lost.

Oct. 22d.—L. E., fingers at 70 *cm.*; R. E., fingers at 8 *cm.*

Nov. 5th.—L. E., fingers at 25 *cm.*; veins (especially the lower) appear to be larger; R. E., fingers seen at 6 *cm.*

Jan. 14, 1883.—L. E., fingers at 10 *cm.*; veins decidedly larger; R. E., fingers at eye.

Jan. 28th.—Fingers at 50 *cm.* L. E., much greater concentric limitation of visual field than on Oct. 1, 1882; R. E., fingers at 10 *cm.*

March 20th.—L. E., fingers at 10 *cm.*, sees only blue, one vein below has double the calibre of a normal vein; R. E., motion of hand immediately in front of eye.

CASE 10.—Moritz Gr., traveller, twenty-five years.¹ No syphilitic history. Occasional vertigo three years, strabismus two years ago, which disappeared after three months; two years ago decided paræsthesiæ in the upper extremities, which lasted some months; bladder trouble for one and a half years; during the last year intense feeling of fatigue at night after only slight exertion, just as if "he had walked many hours." Lancing pains for eight months; frequent emissions; precipitate ejaculations of semen; for two months paræsthesia in soles of feet. Weak physique; sensibility and motility normal; normal tendon reflexes. If any, the patellar reflex somewhat increased; some ankle clonus; no ataxia. Pupils: R. $2\frac{1}{2}$ *mm.*, L. 3 *mm.* in diameter, react promptly; both opt. discs show gray-white discoloration. Vessels normal in number and size. L. E. $4\frac{1}{2}$ D., V. $\frac{1}{8}$, Jg. 3; visual field almost normal; recognizes all colors. R. E., fingers at 4 *m.*, Jg. 8 (fig. 4).

Cases 1, 2, 6, 7, 9 were observed at the eye-clinic, 4, 5, 8, 10 at the medical division, and 3 at the Home for Incurables.

As is seen from the foregoing cases, *both* eyes were constantly affected, and in every case in different degree. The difference is very great, for example in the eyes of case 6, where the left eye had V. $\frac{1}{8}$ and the right had only quantitative vision. It was never observed in tabes that one optic nerve was completely atrophic, while the other eye enjoyed perfect vision.

The ophthalmoscopic appearances are always marked

¹ The diagnosis of tabes was confirmed by two local specialists.

when the visual disturbances begin. Förster (1) says: "I have never been able to follow up the gradual atrophy; in the tabetics whom I have seen, great as their number is, I have always found the atrophy already established." The essential and—as we shall see later—the only essential is the discoloration of the papilla; the latter is either of a grayish-, bluish-, or greenish-white, but not altogether white—at least not during the progress of the atrophy,—never "chalky," if any thing rather "*nacrée*" (mother-of-pearl lustre) Charcot (11). The contours of the papilla are always sharp, as sharp as the contours of the full moon in relief against a cloudless sky at night, to which comparison I am tempted to add the color of the moon as a third resemblance. "Should the atrophic process occur in a papilla with physiological excavation, the excavation is in the first period distinctly demarcated and retains its steep margin; only the difference in color is missing, inasmuch as not only the floor of the excavation but the entire papilla exhibits a bluish-white color." "Through the atrophy the lamina cribrosa appears more distinct and becomes visible in a larger area. The papilla then appears covered by bluish-gray angular patches, between which lighter shining white strands remain, which correspond to the connective-tissue trabeculæ, while the spots represent the atrophic nerve-bundles" Leber (2).

The condition of the papillary vessels is very characteristic. That with atrophy "the most important and earliest developing symptom is attenuation of the vessels," as Mauthner (3) claims, has been questioned by Leber—at least in genuine atrophy, whereas in neuritic atrophy the statement is correct—because the vessels are subject to variations in the normal condition.

In reality matters are as follows:

In the beginning of the process, when vision is but slightly diminished, no change is found aside from the discoloration of the papilla. If the process has already reached a certain intensity and the visual power is considerably diminished, the vertical vessels are found intact, but sometimes the transverse vessels are found in fewer

number. If the atrophy be already far advanced (from 1 to $1\frac{1}{2}$ years, sometimes earlier, dating from the beginning of the trouble), one sees one or more veins—usually of the lower—wider than normal; one believes himself to be mistaken, but possibly after four weeks this vessel (or vessels) appears remarkably wide, and may after a longer or shorter period present twice the width of a normal vein. It must be accentuated here that these tabetics had no brain-symptoms of any kind, so that, aside from the sharp contours of the papilla and its vessels,—the dilated veins being also sharply outlined,—the supposition of optic neuritis in consequence of a cerebral disorder must be altogether excluded. I saw the progress of vascular dilatation very distinctly in cases 2 and 9, and have made references to this in the histories. After the entrance of such a wide vessel into the retina, the vessel remains dilated for some distance, to gradually assume the calibre of the other retinal vessels. After a duration of the optic-nerve atrophy for years the papilla is often found decreased as a whole and the vessels narrowed, but the pathological changes of the latter cannot be remotely compared to those which commonly follow papillitis. I have no experience whatever as to the mode in which the wide veins after years become narrow again, nor do I know if they become narrower at all.

The observations here related were made in the direct image with an ophthalmoscope of feeble illumination, and they were compared with such of the eyes of normal persons. At all events, the relations are so marked that a comparison with normal eyes is not essential.¹

The ACUTENESS OF VISION is not "in direct proportion to the ophthalmoscopic appearances"—Stellwag (4). Two eyes, of which one had V. $\frac{8}{18}$ and the other could count fingers at 1 m., can not be differentiated by the ophthalmoscope; this was indeed best seen in the eyes of one and the same patient, in one of which he had V. $\frac{8}{18}$ and in the other only quantitative perception of light (case 6), the papillæ being

¹ Dr. Dimmer, assistant physician, has obligingly assumed the task of reviewing and confirming the ophthalmoscopic conditions. I take this opportunity of expressing my thanks to him.

equally discolored and the calibre of the vessels presenting no noteworthy differences. If the atrophic process has begun the visual acuteness sinks within a few months to a minimum (fingers counted from $\frac{1}{4}$ to 1 *m.*), decreases gradually till only quantitative perception remains, and ordinarily remains stationary at this point; rarely does complete amaurosis occur.¹ The left eye in case 2 sank in the course of three and a half months from V. $\frac{8}{10}$ to perception of the finger at the eye, the same occurring with the right. The slow diminution of vision after it has reached a certain (low) grade is exemplified in case 9. At one time it even appeared (Jan. 28th) as if there was improvement; the visual test made several weeks later did away with this illusion. In case 3, finally, we see that an atrophy may exist for thirteen years without leading to complete amaurosis. The remark may here be made that the condition of visual acuteness in tabes differs from that of multiple sclerosis, inasmuch as with the latter it more rarely sinks so far as with tabes; it usually remains stationary at a certain stage (fingers at 2 *m.* to 5 *m.*). Thus a patient with multiple sclerosis was discharged last September and returned to the hospital seven months later, his visual power (fingers at 3 *m.*) not having deteriorated. An intelligent teacher of music suffering from the same affection states that his visual impairment has not altered for one and a half years, he seeing fingers at 4 *m.* The anatomical explanation of this fact will be given in the sequel.

FIELD OF VISION.—“If an atrophy begins with a central defect or central scotoma,” this indicates, “that we are not dealing with a tabetic atrophy” (Förster). But also the visual field with “sector-like” defect does not indicate tabes. The characteristic visual field is the one with concentric limitation, as shown in case 8, (figure 2). With tabes dorsalis the entire optic nerve is uniformly affected by the atrophic process. The most peripheral portions of the

¹ It happens very rarely that the atrophy remains stationary half way and then advances anew after some years; I have observed this in one case in which the tabes also seemed to have remained stationary, at least the lancinating pains were said to have ceased several years in the forty-seven-year-old patient.

retina, which also normally have a lesser visual power, become functionally disabled immediately with the beginning of the illness; later, those nearer the centre. We might suppose that if the muscles of the arm were attacked by a degenerative process, the most frequently used muscles would retain their motility longest; in the same way the central—most practised—portions lying around the macula retain their functional ability longest, while the portions far from the centre see no longer, although the fibres going to the latter are not more atrophic than those going to the central portions of the retina. Such great concentric limitation as that shown in figure 3, is a great rarity with V. $\frac{8}{4}$. We cannot assume that the axial optic-nerve fibres are intact and the peripheral ones atrophied, since Samelsohn (5) and Vossius (6) have shown by their pathological researches that the fibres which are central in a part of the nerve distant from the eyeball (in the region of the entrance of the central vessels) lie in the temporal side of the nerve nearer to the globe. It cannot, therefore, be that form of atrophy described by some authors, in which the peripheral fibres are destroyed and the central ones remain. With multiple sclerosis a visual field with pronounced sector-like defects is often found.

A very important diagnostic feature is COLOR-BLINDNESS; or, as we would prefer to say more correctly, INSENSIBILITY TO COLOR, and diminished sensibility to color. It is a constant symptom of optic-nerve atrophy, and may be very plausibly explained by assuming with Schirmer and Schön (7) "that the greatest energy of the color-sense is necessary for the appreciation of green, the weakest for the appreciation of blue; or, to express it better, green excites the optic-nerve fibres the least, red more, blue the most." It may be incidentally remarked that we do not love the green in nature so much for the reason that our eye is accustomed to it from the earliest childhood, as because it irritates the eye less. A Munich artist with normal color-sense stated that he did not know any milder tint than a "light green." When atrophy of the optic nerve occurs, and the fibres are but moderately affected, they become

insensitive to that color which excites them least, viz., the green (cases 6 and 8); with a more intense affection red disappears, then yellow, and finally only the blue remains. This last color the patients see even when their visual power is very small, as, for example, in case 9, who could recognize fingers only at 10 *cm.*, but appreciated a blue paper as such. It has been above remarked that the more peripheral a part of the retina, the less visual power must it have; we cannot, therefore, be surprised to find that the visual field for green appears to be concentrically limited as contrasted with that for white, because the visually weak, most peripheral parts of the retina do not react on the but slightly irritating green. If, now, an atrophic process begins in the optic nerve, peripheral portions which previously were sensitive to green become insensitive to the same, and only the macula portion will be able to recognize green (fig. 4). This process continues: the part referred to becomes first less sensitive, and then altogether insensible to green. In the meantime, the visual field for red has begun to contract (see fig. 5); it becomes reduced to the central portion; this portion still distinguishes red. The process continues still further: the macula region becomes less sensitive to red—which appears brown to it,—finally insensitive, and ultimately the perception of blue remains only in a small central part of the field of vision. Meanwhile, while one color after another disappears from the visual field, the field for white has considerably contracted (fig. 3). It is, therefore, not only the case that "the appearance of color-blindness has been occasionally noted," as Leyden (21) says, but color-blindness is a postulate of tabetic atrophy, and a differential point from partial atrophy—hemianopsia—Mauthner (8). It is clear that with the latter the color-perception of one half is altogether destroyed, as the optic-nerve fibres, which supply it, have become altogether incapable of conduction; adjoining the blind portion of the retina there is, however, a well-seeing portion with complete visual power, sensitive to all colors, because the part of the optic nerve which supplies it is entirely normal. Here I may be permitted to refer to the following case: a patient with

retinitis pigmentosa had the normal visual field for white; his visual field for green was limited to the macula portion; the function of the peripheral portion of the retina was, therefore, not so much weakened that it—as commonly is the case—could not perceive white, but for green it was insensitive.

The subjective condition of tabetic patients with optic-nerve atrophy is characteristic. Their first symptom is the "fog," which is remarked by nearly every one of them; some speak of a "twilight" which seems to continue throughout the whole day. The fog is not peculiar to atrophy as some believe, patients with cataract and other diseases of the eye also complaining of it. I cannot agree with the view of Samelsohn (5), who declares the fog to be a phenomenon of irritation; it is against this view that the fog, which is at first a very faint one, is described by patients with advanced atrophy, with whom every nerve-fibre irritation may be safely excluded, as being dense, and right before the eye. There is also opposed to this the case of optic neuritis, in which the fog was complained of only when the atrophy had begun to develop. The tabetic patient with atrophy is so much absorbed by his eye-trouble that he forgets the existence of his other less troublesome symptoms; he does not wish to be convinced that he has a nervous disease; his lancinating pains he considers to be rheumatic, and his bad gait he attributes to his bad vision. In later stages, as Förster remarks, the feeling of contentment of the patients is noteworthy, with their never-failing hope that they will finally improve; and even when they are completely blind they deceive themselves and others about their condition. One patient told me joyfully that she could see her fingers distinctly when before the eye, though she could not see even the hand of another person.

As to the CONNECTION OF THE OPTIC-NERVE ATROPHY WITH TABES very different views prevail. Some (Erb, Græfe) maintain that there is no anatomical connection between the optic nerve and the posterior column which could explain the extension of the process from the spinal cord to

the eye, but that it is one and the same pathological process which affects two separate regions. Others have sought for a connection by different methods, but have failed to find it. Rieger and Forster (9) have very recently published a paper in which they claim to discover a patho-anatomical connection by means of the sympathetic; they designate as a spinal optic-nerve affection one "which appears by means of a vaso-motor disturbance in direct dependence on the primarily diseased parts of the spinal cord." As plausible as this view seems to be, it is not yet—one must say "unfortunately"—supported by clinical and experimental facts. No one has yet found the slightest vascular disturbance with beginning tabetic atrophy (with good visual power), and it would be very remarkable if the central vessels and no other branches of the carotid were to be affected by a sympathetic disturbance.

Schultén (10) has recently shown, in an article on cerebral disorders and their influence on the circulatory conditions of the eye, that the interruption of the fibres of the sympathetic has no influence whatever on the circulation in the eye; and in two rabbits in whom the cervical sympathetic together with the sup. cervical ganglion was extirpated,¹ I could not find, either immediately or after two and a half months, the slightest changes in the ocular background.

All this conflicts with the view of Rieger and Forster. If we further bear in mind that the optic-nerve atrophy sometimes precedes the commencement of the initial symptoms of tabes by years, and where we have not the slightest reason to suspect a disease of the posterior columns, we will have to abandon the idea that there is an influence of the spinal on the optic disorder. It would be more plausible to say that with a person who has a disposition to sclerosis of the central nervous tissues, the cord becomes diseased first, and later and independently, the optic nerves, or *vice versa*; and if somebody objectingly remarks that it is strange that of all the peripheral nerves the optic nerve only becomes diseased, we may with Charcot (11) answer, that the texture of this

¹ Dr. Jul. Wagner, assistant to Prof. Leidesdorf, kindly attended to the operative portion of the experiment.

nerve, before all others, is remarkable by its resemblance to the structure of the central nervous fibres. Also the genuine—that is, the so-called genuine—atrophy, where we know nothing of the cause of the optic-nerve disease, may be ranged here. There are persons who have a tendency to disease of the connective tissues of the liver and kidney; other “connective-tissue individuals” there are who incline to sclerosis of the central nervous system. Of this group one member may be affected with optic-nerve atrophy alone, a second with optic-nerve atrophy and posterior spinal sclerosis, and a third with the latter alone. In the first case we are compelled to believe that the spinal cord resists the disposition to connective-tissue formation, and in the third case we must believe the same of the optic nerves. Besides, the genuine atrophy is much rarer than is generally believed. Thus Uhthoff (15) in twenty-four cases of pure genuine atrophy found the knee-phenomenon absent seven times; of these seven, four had myosis: with the other seventeen who had the knee-phenomenon, two showed absence of the pupillary reaction, and in three the deterioration of vision began with a central scotoma (therefore probably retrobulbar neuritis).

The pathological process in tabetic atrophy begins simultaneously in the nerve, chiasm, and tract (Leber), or it affects the peripheral segment and “extends with a sufficiently long duration beyond the chiasm as far as the corpora geniculata” Stellwag (4). The tracts are then found changed to flat “grayish” bands, as they were, for example, found in case 4. By the shrinkage of the nervous tissue the intervaginal space of the optic nerve “is changed to a broad ring-shaped sinus” (Jaeger).

Under the microscope there are found, in the atrophic optic nerve, changes similar to those of the sclerosed posterior columns; if one has the opportunity to obtain parts of both organs from the same individual for microscopical examination, this is particularly distinct; here as there is seen disintegration of the nerve fibres to connective-tissue fibrillæ; here as there are seen slight increase of the connective

tissue and slight thickening of the adventitia of the large vessels, and occasionally corpora amylacea.

It is well known that with the atrophic process, first the myelin and then the axis-cylinder disintegrate into connective-tissue fibrillæ: this, as I believe, explains why we find the papillæ discolored even with almost undisturbed visual power, and that we never succeed in following up the gradual discoloration. For as long as the axis-cylinder is intact, so long the visual power is not specially affected; in accordance with this we find with V. § (case 10), on ophthalmoscopic examination, a discolored papilla; we are justified in making the diagnosis of atrophy, there being atrophic degeneration of the myelin. This circumstance, which has been brought into relief in the case of the optic nerve by Charcot (11), and for the rest of the nervous system by Ribbert (22), explains why, as above stated, the visual power in multiple sclerosis remains stationary at a certain point, and does not altogether disappear as with tabes.

We have now come to the anatomical discussion of the ophthalmoscopic appearances of the vessels. I said above that the vessels are at first normal; after a longer duration one or more of the veins dilate remarkably, and in later years we find a slight change of the vascular lumina. This is to be explained, anatomically, as follows:

With the atrophic process, the part of the optic nerve over the lamina cribrosa, shrinks "to a thin layer of fibrous tissue," as no powerful connective-tissue framework "can give the tissue support." Toward this process the arteries, which can be compared to thick, hard-rubber tubes, remain quite indifferent; this is different with the veins. These at first, perhaps, remain unchanged, but when the nervous substance which surrounds the loose connective tissue adjoining the venous adventitia shrinks, a space must be formed between the vein and the shrunken nervous tissue, which would remain void if it were not filled out by the gradually expanding vein; this latter acts like a soft-rubber tube through which fluid runs, and which is embedded in a matrix; if the matrix around the rubber vessel decreases, the vessel will fill out the empty space, expanding to its utmost possible limits.

That this dilatation of the veins only occurs after the process has lasted a certain time, and when the visual power is almost gone, is evident from the foregoing. The part of the optic nerve visible with the ophthalmoscope is composed in its greatest portion of axis-cylinders; these being more resistant than the myelin, disappear, as previously stated, much later than the latter; then visual power becomes entirely lost, and it becomes possible for the venous dilatation mentioned to occur. A similar relation is observed with the sclerosing process of the vessels in the brain and spinal cord; "they are at first, and for some time further on, intact, as far as the microscope shows, with the exception that they are preternaturally wide" (Ribbert); and we may add that this also applies to the eye, as far as the ophthalmoscope permits a conclusion. The vessels are probably, as Adamkiewicz (20) states, the medium of the sclerotic process, but with this they themselves remain nearly intact.

For the sake of completeness, I shall waste—unfortunately but waste—a few words about the therapeutics of tabetic atrophy. For whether we give strychnia or potassium iodide, santalin or silver preparations, while the patients feel subjectively bettered in their general condition after each of these drugs, the eyes, and this they themselves will add sadly but hopefully, "do not at all seem to improve." Electricity only serves to treat these patients for a time without medicines. And there thus remains for the physician nothing more—as he cannot here even treat, as with the other symptoms, symptomatically—than to keep up the hope of the patient that there finally will be some change for the better; and in few diseases are the patients so easily solaced with such hope as in tabetic atrophy.

II. THE PUPIL.—The disturbances of the pupil in tabes are: 1, reflex iridoplegia; 2, absolute (*total*) iridoplegia; 3, myosis; 4, inequality of the pupils. Each of these symptoms, when found in an individual, justify the physician in enquiring after tabes. Besides these four pupillary changes, another is mentioned by some authors as found in the initial stage of tabes, viz., bilateral mydriasis; I have myself seen very wide pupils (4–6 mm.), but never so wide that

one could speak of mydriasis. This symptom would have to be interpreted as an irritative manifestation of the cilio-spinal centre, analogous to the increased knee-phenomenon found by N. Weiss at the beginning of tabes.

By reflex iridoplegia is understood the lack of pupillary reaction to light; with total iridoplegia the reaction on convergence is also absent (without the accommodation being therewith absent). By spinal myosis is meant the narrow pupil found with disease of the spinal cord, and which shows the following characters. It either reacts to light or not (the latter being more frequent); under atropine it dilates to medium width (4-5 *mm.*), under pilocarpin it narrows very rapidly; further the following point is characteristic, which thus far was unknown: the pupil, dilated to medium width by atropine, requires a long time (frequently 4-5 weeks) to again become as narrow as it was before the instillation of the mydriatic. The pupillary inequality is a very striking symptom, but is not so characteristic as the other disturbances, as—however rarely—it also occurs with other individuals. Of all changes in the pupil it is the most frequent; the next in frequency is the reflex iridoplegia. That spinal myosis reaches the highest percentage with some authors is to be explained by the fact that moderately wide pupils are usually not at all examined with regard to light-reaction, and because pupils measuring 3 *mm.* are already designated as myotic, which is really improper, because with many healthy persons with moderate illumination by daylight the pupils show no larger dimensions. Myotic pupils are frequent, but they are not necessarily devoid of reaction, for example:

CASE II.—Peter W., forty-five, formerly an actor, afterward hair-dresser; never had syphilis; practised onanism from earliest childhood; lived a most dissipated life; married sixteen years; has no children. Lancinating pains and paræsthesiæ in lower extremities for five years; for four years frequently experienced the girdle sensation; difficulty in walking for the last three years; urinary difficulty for two and a half years; impotence for six months. Both pupils about size of head of pin, but left a little larger than right; left pupil reacts on artificial illumination, right pupil re-

fectically immovable ; knee-phenomenon absent ; motility normal ; sensibility diminished on right and normal on left side ; Brach-Rhomberg very well marked.

The next a case of iridoplegia reflectica.

CASE 12.—Johann M., thirty-eight years. Had lues sixteen years ago ; had undergone fourteen years ago every privation during the campaign ; impotent for nine years ; for four years slight fatigue after but short exertion ; lancinating pains for one year ; girdle sensation for two months ; cramp-like pains in the stomach and abdomen (crises gastriques ?) ; strongly built. R. pupil $4\frac{1}{2}$ mm., L., 3 mm., reflectically immovable, prompt reaction on convergence ; V. = $\frac{1}{2}$ on either side ; sensitive to pressure over vertebræ, from middle of dorsal to lumbar region. Knee-phenomenon on left side quite normal, but very much diminished on right side ; sensibility and motility normal ; slight ataxic phenomena.

The next is recorded as a case of absolute iridoplegia.

CASE 13.—Joseph B., coachman, forty-two years. Lancinating pains for many years ; urinary disturbance, and paræsthesiæ in lower extremities for one year ; girdle sensation for one month ; bad gait for eight months ; strongly built. Pupils 4 mm. in diameter ; on Nov. 10, 1882, reflectically immovable ; react slightly on convergence ; on Jan. 20, 1883, wholly immovable ; preserved accommodation. Sensibility and motility normal ; tendon-reflexes absent ; increased superficial reflexes ; decided ataxic walk ; urine alkaline and cloudy.

Two cases of pronounced spinal myosis.

CASE 14.—John E., post-officer, fifty-two years. Has had lancinating pains for sixteen years, difficulty in walking for eight years, and for four years, in fact, the patient cannot walk at all ; paræsthesiæ for six years, bladder disturbance for three and one half years, and impotent for six years ; never had lues ; emaciated person ; upper extremities normal, but very much diminished localization sensation in the lower extremities ; knee-phenomenon absent ; motility still good ; patient cannot stand. For the last four years the patient noticed that his pupils were diminishing in size, and fears that as a result of this he will become blind. R. pupil about $\frac{1}{2}$ mm., L. about $\frac{1}{4}$ mm. ; both immovable.

CASE 15.—Ferd. Joseph F., thirty-seven years, tailor. Came into hospital on account of an inflammatory œdema of lower extremities ; attention having been drawn to the case on account of the pin-head size of the pupils, we discovered on inquiry that he suffered for the last two years with lancinating pains and paræsthesiæ in the lower extremities ; knee-phenomenon absent ; superficial reflexes increased ; sensibility and motility normal.

Before proceeding to a closer discussion and explanation of the pupillary symptoms, it may be well to record a few anatomical data. The motions of the pupil are under the control of three nerves, which pass to the eye from the ciliary ganglion : they are the short root (from the third pair), the long root (naso-ciliary branch of trigeminus), and a branch from the cervical portion of the sympathetic. The fibres of the latter are said to take their origin from the cilio-spinal centre of Budge, between the seventh cervical and second dorsal vertebræ, then to unite in the superior cervical ganglion from which the vaso-motor and musculo-motor fibres for the dilatator iridis are said to emerge. The centre for the oculomotor nerve participating in the pupillary movements, according to Hensen and Völkers, lies between the third ventricle and the aqueduct of Sylvius, so that from before backward we would encounter : first, the centre for the ciliary muscle, then that for the pupillary sphincter, and, finally, that for the internal rectus—Leeser (12). The views as to the seat of the reflex centre interpolated between the oculomotor and optic nerves differ. It may be just here mentioned that Longet and Budge locate the reflex centre in the anterior pair of the corpora quadrigemina.

Of the three nerves, the oculomotor is "by far the most important ; its integrity is a *conditio sine qua non* of physiological movement"—Arlt, junior (13). The sympathetic and trigeminus participate only under abnormal circumstances. Thus, according to Cheauveau, active pupillary dilatation ensues on irritation of the posterior spinal nerve-roots ; according to Notta this occurs with trigeminal neuralgia, further in some sensitive individuals when they are yelled at, and—according to my own experience—in spinal irritation on touching the hyperæsthetic skin, etc.

We may now enumerate the phenomena occurring after the exclusion of any one nerve. If the oculomotor is divided, permanent dilatation occurs, which is increased by irritation of the sympathetic and trigeminus; according to Arlt, Jr., division of the latter nerve produces dilatation of the pupil, after some seconds contraction follows, and this in higher degree than after division of the sympathetic; this contraction occasionally disappears already after half an hour. The division of the superior cervical ganglion of the sympathetic has yielded different results to different experimenters. In the case of two rabbits in which a large part of one cervical sympathetic together with the ganglion had been extirpated, we could note no change either in the mobility or size of the pupil on the operated side; of course this cannot be accepted as conclusive for the case of man. On the other hand, distinct dilatation of the pupil has been observed in diseases of the sympathetic where there was pressure on this nerve, etc.

Under normal circumstances contraction of the pupil follows the influence of light, convergence, and accommodation; dilatation follows the cessation of the action of light and of convergence.

With reflex iridoplegia the reaction to light is wanting; as the optic and oculomotor pairs are otherwise intact, it is believed (Hempl, 14) that the cause of this disturbance lies in that reflex centre whose location we are at present not accurately acquainted with. Now what morbid process are we to suppose as occurring in this reflex centre? A sclerotic process? Is it permissible to believe that in all cases of reflex iridoplegia the rest of the brain is intact, and that that—certainly minimal—locality of the reflex centre and only this is sclerosed? I could offer a different explanation. I have observed in many patients who were down with severe pneumonia or typhus (without meningeal symptoms), that light failed to produce pupillary reaction; if the patients recovered, the movements of the pupil following light returned. It is further known that in deep sleep, artificial light, as well as daylight, produces no reaction of the pupil; with light sleep this is not the case. Both facts

can be explained by this: that the irritability of the central nervous system—pathologically in the former, and physiologically in the latter case—is so much lowered that the most delicate of all reflexes, the pupillary reflex, has lost its function toward light. The pupil is like a fine balance—the slightest irritation produces a reaction, the slightest interference completely suspends its function.

When we now recollect that the tabetic is a “connective-tissue individual,” that his central nervous system *in toto* is inclined to sclerosis, which, it is true, appears as a distinct anatomical process only in the posterior columns (and in the optic nerve), but that certainly also the rest of the nervous system undergoes a change which sometimes manifests itself in “hardening of the brain”—an anatomical expression for which as yet any anatomical basis is wanting,—it must be confessed that it is proper to speak of a diminution of nervous excitability in tabetics, which, while too slight to produce coarse functional disturbances, suffices to disturb the sensitive reflex mechanism of the pupil, that most delicate of æsthesiometers. Women, as a rule, have a more readily excitable nerve-centre than men, and Möli (17) reports that the light-lame pupils of men remained immovable on sensory irritation of the periphery, while in women they often responded by dilatation. I hence believe that we cannot attribute reflex iridoplegia to any direct anatomical basis, but that we must assign it to the generally reduced irritability of the brain due to a morbid process. If total iridoplegia develops from reflex (case 13), we must say that the capacity for reaction has suffered a further diminution, inasmuch as the pupillary contraction which accompanies contraction of both internal recti also remains absent. We cannot suppose the existence of a paralysis of the sphincter, for in this case pilocarpin would not be able to produce a reaction; indeed, in these very cases we see perhaps a more rapid contraction of the pupil than in health. A case may be here referred to which, while not properly belonging here, owing to the absence of nervous symptoms, is calculated to prove of general interest.

Catherina F., twenty-six years, cashier, noticed for about four months that her left pupil was larger than her right ; this she at first discovered in the disturbing dazzle of gaslight, but paid no further attention to it since it did not inconvenience her. Lately the "dazzle" became more marked, and on that account she comes for treatment. The girl is a healthy, strong person, and alleges she never had syphilis. In regard to the central nervous system and the other organs there are no abnormal manifestations. R. E., V. $\frac{1}{8}$; + 0.50 V. $\frac{1}{8}$, Jg. 1 in 12 cm.; pupil 3 mm. in diameter and reacts promptly. L. E., with stenopæic slits, $\frac{1}{8}$, Jg. 1 in 15 cm.; pupil 5 mm. in diameter, does not react either to light or on convergence; with atropine 7 mm. in diameter, hardly growing smaller after eight days, and on introduction into eye of one drop of pilocarpin very quickly diminished to size of pin-point. The left pupil was hence totally immovable, but still showed prompt accommodation; otherwise Jg. 1 in 15 cm. could probably not have been read; yet, in regard to its action with atropine and pilocarpin, this case is less clear than it was from the beginning.

A very marked symptom is the myosis. It occurs as frequently as in tabes only in progressive paralysis; it may appear in the earlier stages of tabes or later, and increases with the progressing spinal disorder. Thus an intelligent patient related to me that four years ago his attention had been directed to his narrow pupils; that he had followed their progressive narrowing since then before the mirror, and feared very much that he would become blind by their closure. With what dimensions we are to consider the pupil in a state of spinal myosis or only normally narrow it is difficult to determine, as in older people whose occupation compels them to accommodate continually, the pupils are really surprisingly narrow. The reaction to light is, it is true, frequently, but not always, a criterion. The observation of pupils under $2\frac{1}{2}$ mm. should always direct our attention to the possible existence of a spinal disorder.

We can discriminate between a spastic myosis, such as occurs with ciliary irritation (iritis), and a paralytic myosis, which latter occurs through paralysis of the dilatator (Leeser).

With the latter we have nothing to do in the present case. Now, the dilatator is not an antagonist of the sphincter, pupillæ in the same sense, for example, as the external rectus is an antagonist of the internal rectus; for we have seen that the normal pupillary movements occur only under the influence of the sphincter, and theoretically, therefore, the paralysis of the dilatator ought to have no influence on the pupil. But actually this is not the case. The cilio-spinal centre—to which is universally ascribed the origin of the disturbance—sends besides its musculo-motor also vaso-motor fibres to the iris, and Rembold (16) says: Given the two forces, sphincter and dilatator, as equal to zero, one factor still remains, viz.: the blood which may fill the relaxed vessels. If, now, the function of the cilio-spinal centre is abolished, the oculomotor nerve being intact, blood will pour into the paralyzed vessels of the iris; in consequence a narrow pupil (possibly $2\frac{1}{2}$ –2 mm.) results; the sphincter can contract; the dilatation on shading the eye will, however, be very slight, as the passive movement—and with such a one we have to deal in shading—is only capable with difficulty to drive the blood from the paralyzed vessels of the iris. The longer this condition remains, the slower will passive dilatation occur after slight contraction of the sphincter; the sphincter will contract spastically, somewhat as convergent strabismus occurs with paralysis of the abducens,—it will remain, so to speak, in a state of irritation. In such a state, of course, all reaction will have been lost; but it is easily seen that this iridoplegia is distinct as to its mode of origin and course from the reflex form; it is easily understood that when the persisting contraction of the sphincter is not very intense a movement of the sphincter can be provoked if a sufficiently strong irritation is employed, and this can be carried out by the holding of an artificial light before the eye in a dark room (case II).

If atropine be dropped into a myopic eye, which drug, according to Stellwag and others, paralyzes the sphincter and excites the dilatator, the latter action of the mydriatic will be wanting, and we will have a pupil like that described

by Rembold in the case of paralysis of both sphincter and dilatator, only that it would be a little wider, because, as it appears, the dilatator is not so completely paralyzed as to be altogether inexcitable to all irritations.

The myotic pupil actually attains a width of 3-4 *mm.* after instillation of atropia; when the action of the atropine ceases, the sphincter contracts anew, until it reaches its previous narrowness; for this, from three to four or five weeks are necessary—the narrower the pupil the longer the time. A spastic myosis (ciliary irritation) differs from the one previously described, in that the dilatation following the use of atropine has often disappeared in twenty-four hours; this can be particularly observed with a florid iritis. If the myosis be of a high grade, the patients complain of bad vision and feel very well after an instillation of atropine, stating that they have not been able to see so well for years as now.

We usually examine the pupillary reaction in a dark room with artificial illumination. The patient is told to close his one eye with the hand, and the examiner moves the wax candle from behind to before the eye to be examined; in this way the disturbing factors of convergence and of other sources of light are excluded. I have often seen pupils which appeared devoid of reaction in the patient's room, illuminated from two sides with daylight, contract with artificial illumination.

It is quite clear to me that the relations of the pupil to the central nervous system are far from being revealed to us; if anywhere knowledge begins with the consciousness of knowing very little, it is here. When one peruses the latest two large and excellent, mostly eclectic, treatises on pupillary movements of Leeson (12) and Rembold (16) one recognizes, since all experiments and views are submitted with objective clearness by them, how far we are removed from a perfect understanding. And the latest article by Rieger and Forster, who believe they have exposed all the relations of the pupil to the spinal cord, has not added very much to the clearing up of the subject.

III. THE OCULAR MUSCLES.—The disturbance of the

eye-muscles in tabes consists in paresis of one or several. It begins, if it develop at all, almost always with the very first symptom of the tabes, but at times it precedes the same by many years. Here is an example :

CASE 16.—Rudolph W., forty-five years, laborer. Had syphilis twelve years ago; gradually developed strabismus eight years ago ; for two years had lancinating pains and paræsthesiæ in lower extremities ; frequent girdle sensation and urinary disturbance for nine months ; impotent for a year and a half ; œdema of the feet for four weeks ; strongly built ; tolerably well nourished. Pupils 3 mm. in diameter ; equally large, immovable; convergent strabismus as a result of complete paralysis of right abducens ; normal visual power ; knee-phenomenon absent ; sensibility in lower extremity somewhat diminished ; motility normal ; ataxia ; Bright's disease.

The paralysis very infrequently appears suddenly ; usually it develops gradually, as exemplified by the previous patient, he having had at first a peculiar feeling of vertigo about the eyes ; in the beginning, only occasional, then finally constant, diplopia ; he then began to squint, which became more and more marked until, over three months ago, when it reached the same intensity that it shows at present. The paralysis may remain constant—the less frequent condition—or, after a presence of several months, it disappears, leaving no traces behind, as a proof of which I have in my possession the histories of some cases, but at times it may reappear again after several years.

CASE 17.—Marie B., forty-six years, had diplopia seventeen years ago ; for fourteen years lancinating pains ; paræsthesiæ for eight years, and since four years the patient cannot go about alone ; amenorrhœa for two years ; great urinary disturbance for one year ; never gave birth to children ; never had syphilis ; the diplopia had disappeared a few months after its appearance, but for about six months it troubles her again ; weakly built. Left eye pupil $1\frac{1}{2}$ mm. in diameter ; rect. sup. paralyzed ; rect. inf., rect. ext., and levator ppb. paretic. Right eye pupil size of pin-head ; rect. ext. paretic. Motility of lower extremities normal ; sensibility diminished ; very pronounced retardation of sensibility ;

analgesia ; absence of tendon reflexes ; ataxia in highest degree.

The views of authors as to the frequency of paresis of individual muscles are divergent. Charcot believes that the muscles supplied by the third pair are most frequently, the abducens less frequently, and the trochlearis only exceptionally, paralyzed. Woinow had already, in the year 1871, expressed the view that the abducens, and particularly the left abducens, was predisposed to tabetic paralysis.

Erb (23) assigns twenty-seven per cent., Möli (17), 39.6 per cent., of paralysis of the eye-muscles in tabes. These figures, notwithstanding the high authorities from which they emanate, have little value, because they must be necessarily based upon the statements of the patients.

The anatomical cause of these paralyses is located by Förster in a disease of the floor of the fourth ventricle. Otto Kahler (18), however, found at the autopsy of a tabetic who had exhibited several left-sided subsequently disappearing pareses of several of the muscles supplied by the third pair, besides other appearances, and with several interesting conditions in the brain, that the oculomotor nucleus was intact. Other authors suspect the medulla oblongata, and N. Weiss (19) a basal meningitis, to be the cause of the pareses. The fact that often only one branch of the oculomotor is paretic while the others are entirely intact ; further, the course and intensity of the affection are against basal meningitis. When, for example, the patient in case 16 minutely states that his abducens paralysis developed gradually within three months without headache and without any other associated signs, a meningitis is scarcely plausible ; and can we believe that there has been an exudation around a small portion of the oculomotor nerve, leaving the remainder intact, when there is paralysis of a muscle supplied by the third pair, and which disappears without further treatment in nine months ; can we believe that after so long a time, the cause being peripheral, a *restitutio ad integrum* can ensue?

I would like to direct attention to another source of

information which may perhaps lead to a result. Adamkiewicz (20) has shown that the path of tabetic sclerosis is determined by the course of the arterial vessels. The vertebral artery supplies the posterior columns with blood-vessels, but it also supplies the basal ganglia of the eye-muscles with blood; these are the arteria cerebri sup. and art. cereb. inf. post.

When now a sclerotic process visible to the naked eye develops on the descending branches, is it then improbable that a similar process should affect the ascending branches of the same artery, although in less intensity and in a way that with our present methods of investigation and the little material at our disposal is not yet microscopically demonstrable? It was previously stated when speaking of iridoplegia that this must be attributed to a delicate cerebral change which is too slight to produce other symptoms. Here we would have to assume the existence of an intense though not yet demonstrable process extending along the ascending branches of the vertebral artery. This theory permits the explanation of all paralyzes of the eye-muscles in tabes. If only one muscle of the oculomotor group be affected we say that the process has chiefly developed in that part of the oculomotor nucleus which corresponds to that muscle. If the paresis precedes the tabes proper by years, it would have to be assumed that the slight process affecting the ascending branches developed earlier than the descending and macroscopically visible one.

The gradual development of the noticeable paralyzes of the eye-muscles also favors the assumption of such a process which would certainly develop very insidiously. How now shall we explain that the paresis, for such it is at first, becomes a complete paralysis; secondly, that the process returns after years? Let us assume that the right abducens nucleus was affected; the process will remain stationary at a certain low grade, and the patient has an abducens paresis and sees double images. He now makes—of course, unconsciously—all exertions to lose these double images; he will exert his external rectus often and intensely in order to see single; and finally will make it resume its

function. Whether new nervous channels develop for this muscle, or another nerve supplies the rectus externus vicariously, I can as little conceive with certainty as we can explain the restoration of the function of the muscles of the extremities after their centres have been destroyed by hemorrhage. Let us suppose the case that the patient—and this occurs rarely—is not able to overcome his paresis; he will have to give up binocular vision altogether, and will rather see single with one eye than double with both; convergent strabismus will then develop, owing to a preponderating contraction of the internal rectus. The above is supported by the fact that the patients declare—and this constantly—that before having become affected with a permanent squint they had seen double for a time. The repeated occurrence of eye-muscle paralyses after these have the first time disappeared completely is to be explained by this: that the sclerosing process in the spinal cord, after having for a while remained stationary, frequently undergoes a rapid intensification, with which sometimes certainly the brain also sympathizes, producing new eye-muscle disturbances which, as far as my knowledge goes, do not then disappear. In reply to the objection that it is not explicable why the facial nerve, for example, whose nucleus lies in the same vascular district as those of the eye-muscles, shows no disturbance, it is to be said that, as above referred to, the morbid process is necessarily very slight; too slight to produce a distinctly noticeable disturbance of the facial muscles, but great enough to produce a slight paresis of the eye-muscles, which merely manifests itself in diplopia. It may be here mentioned, in addition, that it has been stated by others that very slight facial pareses are of frequent occurrence in tabes.

I wish to accentuate once more that the foregoing is given only as an hypothesis, supported by all the facts at our disposal, and that the nature of the tabetic eye-muscle disturbances can be entirely explained only by the assumption of this process.

The question whether we can diagnosticate tabes from a paralysis of the eye-muscles alone must be answered nega-

tively. The eye-muscle paralyses of tabes have in themselves nothing characteristic; if a pupillary disturbance is added, we are compelled to suspect tabes, and if lancinating pains appear, the diagnosis of posterior spinal sclerosis may be accurately made.

The eye-muscle paralyses of posterior spinal sclerosis are found with no other form of spinal disease.

It may be further emphasized that with tabes nystagmus has been observed, and this with movements of the eyeball. This is regarded as an ataxia of the eye-muscles; it is rare, and not to be confounded with the persistent oscillatory nystagmus of multiple sclerosis.

Résumé: Collating all that has been said about eye-disturbances in tabes, it may be emphasized above all, that it does not often happen that a tabetic patient during his life remains free from them. They either manifest themselves in an affection of the optic nerve, or in disturbances of the inner or outer eye-muscles.

1. The optic-nerve atrophy is characterized by the sharply contoured discolored papilla with its peculiar vascular relations, by the at first rapid then gradual diminution of visual sharpness, by the concentric limitation of the field of vision, by the characteristic state of the color-sense (diminution and absence of color-sensibility). Only the visual acuteness and the condition as regards color-perception give distinct evidence of the status and progress of the affection.

2. The disturbances of the pupil consist in reflex and total iridoplegia, in myosis characterized by its reaction to atropine, and finally in pupillary inequality.

3. The paralyses of the eye-muscles develop gradually and disappear slowly. They rarely remain for life, and may recur after having disappeared; they are found with no other disease of the spinal cord.

I feel it incumbent upon me to thank most warmly the physicians in charge of the hospital divisions in which I collected the material for this treatise, Drs. Scholz and Pfleger, and particularly my respected teacher, Prof. Arlt.

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Description of the Drawings (Plate ix).

Fig. 1.—Normal eye. Visual field for white ; $V = \frac{1}{2}$.

Fig. 2.—Belongs to case 8. Visual field for white ; fingers at $3\frac{1}{2}$ m.

Fig. 3.—To case 7. The outer the visual field for white, the enclosed one for blue ; $V = \frac{1}{2}$.

Fig. 4.—To case 11. The outer the visual field for white, the enclosed for green ; fingers at $4\frac{1}{2}$ m.

Fig. 5.—To case 6. The outer the visual field for white, the enclosed for red ; $V = \frac{1}{2}$.

CONTRIBUTIONS TO THE STUDY OF THE RELATIONS BETWEEN CEREBRAL AND OCULAR DISEASE.

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IN all departments of clinical medicine the unusual attention paid during many years to specialistic studies has served to divorce to a great extent the individual discipline from general medicine.

Of late the desire for centralization—for inter-communication—is being felt, and has been well expressed in the prospectus of the new journal for internal medicine started a few months ago by Frerichs-Leyden.

In the case of ophthalmology, repeated attempts to re-establish connection with internal medicine through clinical observation, led directly to the study of cerebral pathology, as involving the most direct relations between two organs intimately associated in their origin, anatomical structure, and function.

Gowers,¹ Robin,² and Mauthner,³ have collected in a very exact manner our present knowledge of this subject, while the physiological relations of the two organs has been carefully studied by Hitzig, Fritsch, Meynert; Charcot, Ferrier; Laborde, Grau, Duval; Wernike, Nothnagel, and Munk.

The words of Fontaine regarding the brain: "*Obscura textura, obscuriores morbi, functiones obscurissimæ*," have

¹ "A Manual and Atlas of Medical Ophthalmoscopy." London, 1879, pp. 352.

² "Des troubles oculaires dans les maladies de l'encéphale." Paris, 1880, pp. 600.

³ "Gehirn und Auge." Wiesbaden, Bergmann, 1881, pp. 255.

no longer the same weight as they had when Hyrtl placed them as a motto at the head of his chapter on the anatomy and physiology of the brain.

Yet the unexplored region is still very extensive. Physiological experiment in the laboratory must needs be modified and supplemented by the careful study of symptoms at the bedside, and of lesions on the autopsy table, that more light may be shed on this still obscure department of medical science.

Led by these considerations, I take the liberty of presenting the following cases from my record-book :

I.—FIBRO-SARCOMA OF RIGHT CEREBRAL HEMISPHERE; BILATERAL OPTIC NEURITIS; ATROPHY OF OPTIC DISCS.

Mr. Mertens, æt. twenty-five, consulted me toward the end of February, 1878, with the following history. Since November, 1877, he suffered from periodical attacks of headache, limited to the occipital region, recurring every two to three weeks, lasting two or three days, and severe enough to prevent him from working. In the intervals he felt perfectly well. These attacks were soon accompanied by gastric disturbance, vomiting, etc. Medical advice was now sought, but his condition not improving under treatment, he applied for admission to the general clinic.

Mr. M., a stoker by occupation, is of healthy, robust appearance, and has never suffered from constitutional disease of any kind. He complains only of neuralgia affecting the right side of the occiput, but denies having received an injury of any kind. On examination of the skull no depression or fracture is discovered, but percussion causes pain and slight dizziness.

The neuralgic pain occurs with tolerable regularity once a week, commencing in the right posterior half of the head and increasing rapidly in intensity. It is accompanied by marked vertigo, obliging patient to keep his bed. After a rest in bed of two days' duration the pain disappears and patient feels well. S=1.

In the early part of March, 1878, patient complained of disturbance of vision, a scintillation before both eyes, especially before the right eye, and was transferred to my wards.

Ophthalmoscopic examination revealed choked disc, far advanced in the right eye, less marked in the left. S. oc. dextr. $\frac{1}{2}$, reads No. 4 (Jaeger) ; S. oc. sin. $\frac{1}{4}$, reads No. 2 Jaeger.

Examination of visual field : O. d. Perception of light good up to 20° from the centre outward, and 30° downward ; the inner and upper-outer portion of v. f. entirely wanting. O. s. Perception good outward both above and below ; v. f. wanting inward above and below—*i. e.*, the nasal halves of the visual field are completely lost.

Mental faculties unimpaired. Patient in good spirits notwithstanding severe neuralgia. Motility of all muscles and sensibility of surface normal.

Pupils of normal size, equally contracted during the attacks, reacting well to light and to movements of convergence.

A course of mercurial inunctions exerted no influence on the intensity or the periodicity of the attacks. The disturbance of vision increased rapidly. Loss of visual acuity and concentric limitation of the field progressed from day to day, so that on March 23d S. in both eyes was less than $\frac{1}{10}$. The signs of stasis increased *pari passu*. A week later fingers were recognized at 4" by the left, at 1" by the right eye. The v. f. of the right eye consisted of a small circle near but external to and below the centre. The v. f. of the left eye was about twice as large, situated on the outer side above and below. Thus the inner halves of the retina reacted to light only in their medial portions. On April 20th total amaurosis of both eyes.

The swelling of the discs now began to diminish, the retinal exudation to be absorbed. Pain in the right posterior half of head as severe as before, recurring every two weeks and lasting 2-3 days, during which the patient's mind was clouded, articulation impeded, and pupillary reaction slow. No elevation of temperature or increased frequency of pulse. Sensation in face and body, motion of eyes and of tongue, normal.

Patient now remembers that in October of last year a heavy door fell, striking him on the right side of the back of the head. With the exception of severe momentary pain this blow was followed by no symptoms subjective or objective, nor can any evidence of fracture be discovered at the present time.

The history of the case and *status præsens* lead us to the diagnosis of a tumor in the cranial cavity, growing slowly and in some way connected with the injury above detailed. The absence of functional disturbance in all the muscles and in the nervous system generally, with the exception of

the loss of sight, the headache confined to the right occiput, the history of an injury to this region, the extraordinarily rapid loss of sight within six weeks,—all these factors tended to locate the lesion in the occipital lobe of the right hemisphere. The diagnosis of an abscess being excluded by the long interval between the symptoms and the injury, from the intense occipital neuralgia and the affection of the eye, which is so rarely observed as a result of circumscribed supuration in the cranial cavity, the existence of a neoplasm intimately connected with the dura mater could be diagnosed with certainty.

All treatment directed to the alleviation of the patient's headache proved unsuccessful, the pain increasing both in intensity and in frequency. Appetite, general appearance, and spirits of patient unchanged.

In the course of the following months the discs became atrophic, slightly excavated; the retinal arteries threadlike. Pupils contracted during convergence, but were not affected by light.

On January 6, 1879, nine months later, patient had an epileptiform seizure with loss of consciousness. Similar attacks with prolonged unconsciousness recurred frequently, being preceded by an aura in the left arm, accompanied by violent clonic spasms of the facial muscles on the right side and of the muscles of the neck on the left side, so that the head was rapidly twisted toward the left side or pressed backward into the pillow, while the features on the right side were the seat of violent contortions. After each seizure the patient experienced a general feeling of debility, anorexia, and loss of memory, a new and more violent attack usually ensuing before the patient had fully recovered from these symptoms.

About July 15, 1879, the sphincters of the bladder and of the rectum began to be parietic, and weakness with a feeling of numbness was complained of in the left leg. While walking, patient swayed from side to side, moving toward the left involuntarily, and being easily fatigued.

Mental faculties unimpaired except during and after the rapidly recurring seizures. Headache constant, general debility increasing. Severe injury to the tongue during the seizures occasionally prevents deglutition for days at a time.

In December, 1879, patient was unable to leave his bed, and

had lost all power over the vesical and rectal sphincters. The left upper and to a less degree the left lower extremity was paretic and anæsthetic.

The right facial nerve was paralyzed, the pupils equally dilated, not reacting to the ordinary stimuli. The seizures often lasted three whole days, the head always being turned to the left, the eyes deviating toward the same side, with nystagmus-like movements around the vertical axis, respiration of the Stokes' type, pulse slow and intermittent.

After repeated attacks of this character, patient died on January 5, 1880, nearly two years after admission to the clinic.

I now believed myself justified in diagnosing a tumor of the right occipital lobe on the grounds already mentioned, viz.: (1) the injury to the skull had been received on the right occiput; (2) sensation of pain was felt in this region only; (3) the facial muscles were paretic on the right side, the muscles of the body on the left side only, all these parts having been the seat of clonic convulsions and showing loss of sensation; but more especially (4) the epileptic seizures pointed to an affection of their centre located in the occipital lobe; and (5) the rapid loss of sight was probably dependent on an organic change in the centre for visual impressions located in the same region.

Autopsy, 18 hours *post mortem*. On removal of the scalp the outer surface of the skull is found to be the seat of a dark-violet discoloration in the region of the right fronto-parietal suture. Opposite this point, the bone, thin throughout, adheres closely to the dura mater. On removing the skull-cap a broad cone-shaped exostosis of the lamina vitrea, $\frac{3}{4}$ " in diameter, $1\frac{1}{2}$ " in height, consisting of a homogeneous ivory-like mass with a nodular surface, is found embedded in the substance of the right lobe, out of which it was easily lifted with the vault of the cranium. In close proximity and posterior to this exostosis the parietal bone is occupied by a translucent circular depression about $\frac{1}{2}$ " in diameter, with sharp edges, and no thicker than a sheet of foolscap. Slight pressure with the nail caused a perforation. There were no Pacchionian bodies at this point, and the thinning of the bone must be attributed to a chipping off of the lamina vitrea, caused by the injury already described.

The dura mater is tense but normal, the pia mater turbid and dull.

The deep, funnel-shaped impression left in the brain-substance

by the cranial exostosis, is of a reddish slate color over an area 8 cm. in diameter.

Here the gyri are barely recognizable, and the finger feels a *heteroplastic* mass of the same extent, sharply defined from the surrounding substance both in color and consistence. Over the remainder of the brain-surface the gyri are normal, the sulci free from plastic exudation, the venous plexuses markedly congested.

On section through the pseudoplasm, it was found to consist of a hard tissue with a creaking sound, when cut, situated between the anterior central and posterior central convolutions, extending in the substance of the right hemisphere to the basis of the right ventricle, covered anteriorly by a very thin layer of gray cortical substance, and of the size of a goose egg.

The tumor was easily lifted from its bed by the point of the finger. Anteriorly it encroached on the anterior frontal convolutions, posteriorly it reached beyond the centre of the meridional section of the hemisphere; the mass being of the same dense, felt-like consistence throughout.

The anterior horn of the right ventricle was obliterated, in the posterior horns some serous effusion was found; the left ventricle was filled with serum.

Remaining portions of the cerebrum and cerebellum more or less anæmic, otherwise normal. Optic tracts and nerves thin, atrophic in appearance on section, of equal size on the two sides. Corpus striatum and optic thalamus of the right side compressed laterally, unchanged in structure.

On microscopic examination the neoplasm proved to be a fibro-sarcoma of strong connective-tissue basis-substance, interspersed with numerous spindle-shaped cells, presenting similar microscopic details in all its parts. The remaining viscera were apparently normal.

In this case, therefore, we find a young robust workman with symptoms of an intracranial affection arising shortly after an injury to the skull had been received. The first symptom is severe occipital neuralgia, soon followed by disturbance of vision.

Ophthalmoscopic examination discloses choked disc on both sides, leading us to the diagnosis of intracranial neoplasm. Judging by the history of the case, and the results of functional examination, we would have located the tumor

in the occipital lobe of the right hemisphere rather than in the central portion of the hemisphere, where it was found at the autopsy.

To explain the origin of the tumor, we must assume that the traumatism in the region of the parieto-frontal suture gave rise to a partial detachment of the lamina vitrea. The sharp-edged fragment, covered by the dura mater, being driven into the brain-substance, the lesion of the brain and of its membranes on the one hand, the constant irritation through the osteoplastic neo-formation on the other, supplied the necessary stimulus for pathological new-growth.

The increase in size of the exostosis, pushing the dura mater into the tumor mass and dragging on its fibres, gave rise to the intense headache. The early disturbance of vision was caused primarily by the direct pressure of the tumor. In conjunction with the epileptic seizures, observed later in the case, it may also be attributed to the influence of the increased intracranial pressure, especially of the right hemisphere, on the occipital lobe with its visual centres and intracerebral tracts.

II.—GLIOSARCOMA OF PONS AND MEDULLA ON RIGHT SIDE; ASSOCIATED OCULAR PARALYSIS; NEURITIS OPTICA OC. UTR.; PARALYSIS FACIALIS DEXTRA; HEMIPLEGIA SINISTRA.

M. Shuhmacher, æt. twenty-six, previously in good health with the exception of a slight pleuritis, applied to me for treatment at the German Hospital in London, in 1873. Patient has resided in England for five years, working in a sugar-refinery as "sugar-baker," an occupation both very laborious and unwholesome, owing to the great heat to which the workmen are exposed.

About five months ago he contracted facial erysipelas, starting from the dorsum of the nose and extending over the entire right side of the face. The attack lasted two weeks, when he resumed work. About eight days afterward he noticed a slight loss of power without pain in the left arm. Some two months ago a similar loss of power, also without pain, was noticed in the left lower extremity. Occasionally, pain was felt in the occiput, radiating toward the right temple, not attacking the left side of the head. After the

erysipelatous attack an undefinable sensation had remained in the right side of the face ; during the last few weeks patient is unable to close the eye of this side, or to whistle.

With the loss of power in the left leg, patient, for the first time, experienced the sensation of vertigo. A gradual diminution of hearing has set in on the right side for two months. At present the right ear is completely deaf.

About the same time the friends of the patient noticed that his eyes were crossed, and he was unable to look toward the right without becoming dizzy. It is, however, probable that strabismus existed before the attack of erysipelas, as the patient was troubled, when descending stairs, by double vision for six months.

Headache, the patient states positively, was not noticed until after the attack of erysipelas.

Appetite and the bodily functions are satisfactory ; sleep sound, not disturbed by dreams. Patient denies syphilitic infection.

Status præsens : Patient robust and well nourished. Facial paralysis on right side, the orbicularis oculi still contracting somewhat, so that the eye can be about half closed. Conjunctiva inflamed. Total paralysis of the rect. ext. oc. dextri, paresis of rectus int. oc. sin. When patient endeavors to look toward the right, the right eye never passes the median line ; the left eye makes a few spasmodic excursions to the right, returning at once to the primary position. Slight paresis of the trochlearis o. d. and of the obliquus infer. oc. dext., also of the rectus super. et infer. oc. sin., motion to the right upward and downward being incomplete and accompanied by diplopia. Both levatores palpebræ sup., the muscles of the right eye supplied by the oculomotor nerve, viz : rectus internus, inferior, superior oc. dextri, and the rectus externus, obliquus super. et infer. oc. sin., exhibit normal mobility. Pupils of normal size, equal on both sides, react well to light and on convergence.

Ophthalmoscopic examination shows transparent media, normal fundus, hypermetropic astigmatism. S. oc. dextr. = $\frac{1}{2}$, oc. sin. = $\frac{1}{4}$; No r is read fluently on either side. V. F. normal.

Tongue is protruded to the left, but can be freely moved to either side ; articulation is somewhat impaired, especially for the lingual consonants. Of late, mastication and deglutition are performed with difficulty ; no food enters the larynx, but liquids are occasionally regurgitated through the nose. The movements of the soft palate are apparently normal and equal on the two sides ; the uvula not deflected from the median line.

The sense of taste is preserved ; the sense of smell has always been deficient.

The neuralgic pain is felt a short distance to the left of the median line posteriorly ; anteriorly it reaches to a line drawn directly upward from the external angle of the eye. On the right, percussion of the skull causes more pain than on the left.

The mind is apparently clear, memory not diminished. Temperature, pulse, and respiration normal.

Two days after admission to the hospital patient suffered from marked dysphagia. Deglutition was immediately followed by vomiting and a convulsive seizure, during which the face became cyanotic, the respiration impeded, the pulse irregular in volume and in strength. These attacks would last about fifteen minutes, being separated by intervals of comparative comfort. Retention of urine also set in, necessitating the periodical use of the catheter.

Two weeks after admission there was a total paralysis of the rectus externus, obliquus super. et infer. of the right eye, and of the rectus internus, inferior, et superior of the left eye ; the obliquus inferior of this eye showed paresis only as evidenced by a limitation of motion upward and outward. The levatores remained normal.

In the right eye, therefore, there was total paralysis of the fourth and sixth cerebral nerves, and paresis of one branch of the third nerve ; in the left eye the fourth and sixth nerves were normal, whilst of the third nerve three branches were completely, one branch partly, paralyzed. On either side, the pupillary branch and accommodation were normal. When at rest the right eye looked upward and inward, the left eye downward and outward.

The history of the case was recorded in 1873. At that time the existence of associated ocular paralysis was unknown. The anatomical connection between the nuclei of the third and the sixth cerebral nerves had not yet been demonstrated. In explanation of the case we were obliged at the time to assume a reflex paralysis ; the right eye being primarily, the left eye secondarily, affected.

Examination of the ocular fundus now showed the disc slightly swollen, its outline blurred, venous stasis without ecchymosis of the adjacent retina, the condition being more marked in the right eye, S. oc. dextr. $\frac{1}{2}$, reads No. 2. V. f. shadowy on the outer side. without actual defect. S. oc. sin $\frac{1}{2}$, No. 2.

The patient's mind remaining clear, the headache increased in intensity, the paralysis of the left extremities became more marked. The soft palate retained its mobility ; the tongue deviated to the left.

Vomiting recurred frequently, always following on the ingestion of food, producing a rapidly increasing debility of the patient. He now complained of a gradual loss of sensation on the right side of the face and the left side of the body, which parts could barely be touched without the patient suffering intense pain.

The paralysis of the left extremities soon prevented him from leaving his bed ; urine and fæces were voided spontaneously, the mind wandered, the speech became mumbling. During sleep the patient snored loudly, the right side of the soft palate being paralyzed. Further ocular paralyses were not noticed, but the " choked discs " were more pronounced.

Patient lay in a semi-comatose condition, interrupted by occasional attacks of convulsions, for four days, when he died in complete coma, four weeks after admission.

Autopsy, 24 hours p. m.—Bones of skull-cap, normal. Dura mater, tense ; marked venous stasis in the arachnoidal vessels of the right hemisphere ; gyri, normal. Brain-substance soft and watery ; both greater ventricles dilated by serum, particularly in their anterior horns. Ependyma granular.

At the base of the brain the right half of the pons is seen to be about one half larger than the left side. Adjacent to the medulla oblongata and in the processus cerebelli ad pontem, it is also harder than on the left side. Toward the medulla its surface is translucent.

The right side of the medulla is twice the size of the left side, and exhibits a like translucency of surface.

Near the pons, two gelatinoid tumors of the size of half a pea emerge from the right pyramid, displacing the basilar artery to the left of the median line. The arachnoid over the pons is turbid and infiltrated with serum.

On the right side, the facial and the acoustic nerve are flattened out and feel harder than on the left side.

The hardness above referred to as found in the pons is limited to that portion of its substance which borders on the medulla oblongata and the pedunculus cerebelli ad pontem. Its surface is nodular.

The change in the medulla affects the right pyramid and one half of the olivary body.

As seen from above, the right half of the fourth ventricle and a small portion of the left half near the median line appear unduly prominent. Under the ependyma ramifications of blood-vessels are noticeable. The striæ acusticæ are well marked, the raphe of the fourth ventricle pushed to the left, its floor less grayish and more whitish in color than is normally the case.

The vermis inferior and the trigeminus are the seat of slight changes. No other pathological changes in the cerebrum, cerebellum, or other viscera.

On microscopic examination the tumor proves to be sarcomatous in nature, containing a great number of small cells, especially numerous in the gelatinoid excrescences, on the pyramid, and must hence be classed as a gliosarcoma.

To recapitulate the salient features of this case, we find a young, healthy man becoming suddenly affected with diplopia due to paralysis of the rectus externus of the right eye.

Facial erysipelas soon follows, after which the ocular paralysis increases, the rectus internus of the left eye becoming affected. Simultaneously cerebral symptoms, headache, etc., make their appearance.

The paralysis rapidly extends to the facial and acoustic nerves of the right side and the branch of the oculomotor supplying the inferior oblique of the right eye.

The superior and inferior recti of the left eye are affected simultaneously, presenting a picture of an associated paralysis of the movements of the eye to the right, to the outer upper and outer lower side. The remainder of the muscles supplied by the third nerve retain their function, disturbance of vision both central and peripheral being but slight.

The opposite side of the body becomes the seat of gradually increasing paralysis, first in the upper, then in the lower extremity; the increase of the paralysis is marked by attacks of vertigo.

Paralysis of the hypoglossus then ensues. The growth of the pathological process within the cranium is further marked by the appearance of dysphagia and disturbed innervation of the vesical and rectal sphincters. At the same time venous stasis at the optic disc is not at all marked.

Hence the intracranial tumor must be small. Finally the mind is affected, and death ensues seven months after the appearance of the first symptoms.

' The course of the disease points to the existence of a tumor of moderate size at the base of the cranium. This tumor must have started in the nucleus of the right abducens, rapidly invading the facial and acoustic nerves, implicating the nucleus of the trochlearis of the same side anteriorly, and then growing backward into the medulla, the pyramids, and the nucleus of the hypoglossal. Having nearly attained its ultimate size, it must have exerted sufficient pressure on the fifth nerve of the same side, to produce the disturbance of sensation noticed in the face.

Already at that time it was clear to us, that the neoplasm could not have invaded the nuclei of the oculomotorius. This follows from the difference in amount of paralysis observed in the distribution of each third nerve. On the right side the branch to the obliquus inferior only was affected; on the left side the rectus internus, superior, inferior, and in part the obliquus inferior were paretic. On both sides the levator palpebræ and the ciliary branches remained intact throughout.

Hence we were obliged to explain the paralysis of the branches of the left oculomotorius as reflex in character. Since then the investigations of Duval and others have demonstrated the existence on the floor of the fourth ventricle of a bundle of fibres connecting the nucleus of the abducens with the nucleus of the oculomotorius of the opposite side. This connection explains why the movements of the left eye toward the right were paralyzed and the paresis of the rectus internus was the first symptom to follow the paralysis of the right abducens.

The paralysis of the facial nerve appearing immediately after the erysipelas, the pathogenetic relation of which disease to the cerebral neoplasm must remain doubtful, is explained by the close proximity of the nucleus of this nerve. The trochlearis being the nearest nerve anteriorly would then be the next nerve to be affected by the growth of the neoplasm.

Simultaneously with the paralysis of these nerves a paralysis of two nerves with associated action is observed: namely, the rectus inferior of the one and the obliquus superior of the other eye; and again of two nerves, which turn the eye in the same direction: viz., the obliquus inferior oculi dextri and the rectus superior oculi sinistri.

The distance between the nuclei of the two oculomotor nerves is small. We cannot well imagine the neoplasm invading this region without destroying a larger number of fibres in each nucleus than were actually destroyed according to the symptoms. Associated paralysis again offers a better explanation.

The existence of a common centre for the movements of both eyes to the right and to the left, effected by the abducens and the oculomotorius, was a physiological necessity, and has been demonstrated anatomically. But a similar necessity exists for a connection between the trochlearis of the one and the oculomotorius of the other side, to account for the simultaneous innervation of the obliquus superior and the rectus inferior.

Meynert has found such a connection between the two nuclei. Duval, however, believes it to be composed of commissural fibres only. Further investigations are requisite to elucidate the correctness of either statement.

The obliquus inferior oculi dextri and the rectus superior oculi sinistri also are associated in their action, turning the eyes in the supero-external and supero-internal directions. These muscles were paralyzed soon afterward, whilst the rectus inferior oculi sinistri was totally, the obliquus inferior oculi sinistri only partially, paralyzed. To explain this we must assume a partial destruction of the fibres of the left oculomotor nerve.

Further speculation regarding the origin of these paralyzes would be useless, but we must yet refer to the dissociated position of the eyes observed in the later stages of the case. At this time the left extremities and the sphincters of the anus and bladder being totally paralyzed and disturbance of sensation having arisen over the distribution of the trigeminus, the right eye was drawn upward and inward

by the rectus superior dext., the left eye downward and outward by the obliquus superior sin.

In similar cases, in which this position of the eyes has been observed *intra vitam*, an affection of the inferior vermis of the cerebellum was found. In our case also this region was the seat of slight changes, due more to the mechanical influence of pressure than to pathological tissue changes, the same cause explaining the diminished sensation over the region supplied by the trigeminus.

The complicated picture, presented in this case, of multiple ocular paralysis due to intracranial disease, is not fully explained by the results of the autopsy, owing to the situation of the tumor at a point where the centres for the individual muscles are massed in a very small space.

Yet it again proves the anatomical basis for the associated action of the abducens of the one and the oculomotorius of the other side, while a similar connection between trochlearis and oculomotorius, already presumed from physiological considerations, receives considerable support through clinical observation.

III.—CYSTOID DEGENERATION OF THE RIGHT CEREBELLAR HEMISPHERE; NEURITIS OPTICA OF BOTH EYES, BUT MORE MARKED ON THE LEFT; SLIGHT DISTURBANCES OF COÖRDINATION; SUDDEN DEATH.

H. Kieler, æt. nineteen years, was admitted to the German Hospital of London, England, on September 26, 1873. He had been a steward on board of a sailing vessel, and had just returned from a prolonged voyage to Australia.

For a year before I saw him he had been troubled by severe attacks of vertigo, which often made walking, or even standing still, impossible. Both the captain and the mate on board of his vessel had often struck him on the head with the end of a rope, as a punishment for his clumsiness while waiting at the table, and to this circumstance he attributed the origin of his trouble. While yet on board ship, he often became giddy, with a tendency to turn to the left side, but he never had any convulsions or loss of consciousness. There was no history of any previous disease.

Condition on admission : Patient of slight build, and pale. There was an excess of development of his right frontal bone, which gave his face a peculiar wry and stupid expression. The supra-orbital margin of this side formed a massive protuberance. There was a slight displacement downward of the right eyeball on account of a downward protrusion of the roof of the orbit. No pain was felt, on pressure, over this region. This striking disfigurement had been present since early youth. He had never met with any injury to this particular region. The movements of the eyeballs, separate as well as associated, were normal, and the media clear. Both optic discs were of a pink color, their outlines somewhat blurred and the veins wavy. They were slightly swollen, the left more so than the right, but S was normal in both eyes.

While walking, the patient had a tendency to deviate to the left side. When standing on one or both legs, with eyes either open or closed, his body would lean over to the left side. There were no other abnormalities of motility, and his sensibility was unimpaired. His pulse, as well as his temperature, was normal.

There was no change in his general condition for the first few days after his admission to the hospital. He occasionally complained of a headache, which, however, he was unable to refer to any particular locality. He slept well. The swelling of the discs increased rapidly. The edge of the left disc, especially, became wholly obliterated by the striation of the nerve-fibres, the veins became tortuous, and the calibre of the arteries diminished considerably.

The question naturally arose, what connection, if any, there was between these symptoms and the hypertrophy of the frontal bone; but all the signs being of an indefinite nature only, not even a guess could be made as to the nature and localization of the pathological process which was undoubtedly going on within the cranial cavity.

On the afternoon of October 3, 1873, a week after his admission, the patient had a fit of nausea and vomiting, without any headache. He soon recovered from this fit, and went to sleep. After the lapse of several hours, he began to moan and to throw himself about in his bed. His pulse was fifty per minute, weak, and irregular. When spoken to in a loud voice, his attention was roused, but he gave no answer. His extremities could be moved. His breathing became stertorous, with deep inspirations. Both

pupils were dilated, and failed to respond to light. His temperature sank below the normal.

Derivatives were applied, but his breathing continued to grow worse, râles supervened, and in two hours he died comatose.

Autopsy, eleven hours *post mortem*: Scalp thick, hyperæmic, and can be readily peeled from the cranium. The right frontal eminence hypertrophied to the size of a pigeon's egg, its top rising to the height of two and a half centimetres above the level of the left eminence. Its structure is that of a compact osteosis. The rest of the skull is very thin, especially at the Pacchionian depressions, where it is no thicker than paper. There is scarcely any diploë. Owing to the abnormal development of the right frontal bone, the corresponding side of the skull-cavity is somewhat narrower than the left. The dura mater can be easily detached, and shows venous congestion.

The surface of the brain is hyperæmic. Its hemispheres are symmetrical, only the right frontal lobe is flattened corresponding to the bony growth. The cranial cavity contains from thirty to forty grammes of greenish-yellow serum. The brain can be readily removed. Its substance is firm, and does not become distended after being lifted out of the bony capsule. On inspecting the basis cerebri, the central structures situated above the pituitary body are found to be tense on account of an excess of fluid contained in the ventricles. The right cerebellar hemisphere is more prominent than the left. The choroid plexus is œdematous and bluish-red. All the ventricles are considerably dilated, most markedly the fourth. The inferior vermiform process is flattened, its structure somewhat indistinct.

The right cerebellar hemisphere contains a cyst the size of a hen's egg. Of the substance of this hemisphere, only the gray matter is left, which forms the thin wall of the cyst. Only below, where this wall is about one centimetre thick, can something of the medullary substance be found. The fluid contained in the cyst is clear, greenish-yellow, and shows no solid particles.

The size of the right orbit is less than that of the left. The position of both eyeballs is normal. The sheaths of the optic nerves are distended by serous exudation. The papillæ opticae project like buttons into the vitreous, the left more than the right. No hemorrhages can be detected in either retina.

The right kidney shows a reticular structure like that of a calf. Both kidneys are hyperæmic.

It had evidently taken several years for the cyst of the cerebellum to form. The disturbances of coördination caused by it were mistaken for awkwardness by the patient's superiors on board of the vessel, and the blows with which they attempted to correct him were therefore the consequence, and not, as he thought, the origin, of his trouble.

According to Norris, papillitis as a rule is an early symptom in cases of cerebellar tumors. In the present case, however, it made its appearance only very late. This was perhaps due to the fact that the tumor was a cyst, and that therefore the way to the subvaginal spaces opened only after the tension in the cyst had reached its acme.

The phenomena of suffocation at the close of his life were caused by the excessive pressure exerted by the ventricular fluid upon the medulla oblongata.

IV.—GRAY ATROPHY OF BOTH OPTIC NERVES; PROGRESSIVE PARALYSIS THREE YEARS AFTERWARD; ATROPHY OF THE RIGHT OCCIPITAL LOBE.

Mr. C., a lawyer, consulted me for the first time, January 17, 1876. He had recently been unable to read small print in the evening, and wished me to prescribe proper glasses for him. He never had any trouble with his eyes before, although he had been doing considerable night-work for many years.

Mr. C. was forty-six years old, a strong and hearty-looking man, with a good family record, and had never had any serious sickness.

At every attempt at fixation his left eye deviated inward to the extent of two and a half millimetres. When tested by itself, its visual power was found to be very poor. This result of the examination greatly surprised Mr. C., who up to that time had not the slightest suspicion of any difference between his eyes. A careful test showed that some quantitative perception of light in the outer part of the visual field near to the centre was all that was left of sight in that eye.

The motility of each eyeball tried separately was found to be normal. The media were clear. Both pupils were equally narrow, dilating only a little in the dark. They contracted during accommodation as well as when light was thrown into the visual organ.

In the right eye there is manifest hyperopia = $\frac{1}{8}$. This being

corrected, S for distance is = $\frac{1}{1.5}$. With + 24 he reads Jaeger No. 1 fluently. The fundus of this eye is normal, but the left disc shows a grayish discoloration, attenuation of the arteries, and slight central cupping. The refraction, as determined with the ophthalmoscope, is hyperopic, $\frac{1}{1.5}$. The eye had been squinting since childhood. In the absence of any signs of a deep-seated lesion I considered the atrophy of the left optic nerve due merely to the long-continued voluntary suppression of its function. At the same time I was somewhat uneasy about the marked bilateral myosis. The patient was given convex No 24.

I next saw him fifteen months later, on April 24, 1877, when he came to me in order to have his glass changed, because the one I gave him had lately proved insufficient.

Upon examining his left eye, I found that it had become completely amaurotic, having lost even the small amount of quantitative perception of light it showed when I first examined it. The gray color of the optic nerve was more pronounced, the retinal arteries were very thin, and the excavation had extended to the margin of the disc.

The visual power of the right eye had also deteriorated. With convex No. 36, S was $\frac{1}{2}$ by good light, and only $\frac{1}{3}$ if the light was reduced. He read Jaeger No. 3. The visual field was complete, but the perceptive power in the peripheric parts seemed to be somewhat less than normal. The lower outer quadrant of the disc showed a white discoloration, but the calibre of the blood-vessels was still normal.

The diameter of both pupils had increased. They were now of medium size and contracted well during accommodation, but reacted only sluggishly to changes of light.

The fact that the right optic nerve had become implicated proved that I had been mistaken in supposing that the atrophy of the left side was due to disuse. It pointed conclusively to the presence of some intracranial lesion. No abnormality of any other function of the body, however, could be found by careful examination.

Patient was prohibited from using his eyes for any work, and active derivatives were ordered. The sudden change from a very laborious professional activity to complete idleness was met by him with a calmness of mind which was quite surprising. He carried out the prescribed treatment faithfully, and rather enjoyed his involuntary leisure time in the family and social circle.

For the next few months no change was noticed in the condition of his eyes.

During the following summer he made a trip to one of the watering-places on the coast of the German Ocean. When he returned, his eyesight was found to have greatly changed for the worse. On September 1, 1877, S of right eye for distance was $\frac{1}{2}$ with + 24, and the nasal half of the visual field was considerably narrowed. The gray discoloration of the optic disc was more marked, and the arteries were thinner. Still no general symptoms could be discovered, and the knee-phenomenon was normal. He had never complained of headache, except once or twice after bathing in the sea when high breakers had submerged him. His pupils were equally wide and contracted well during efforts of accommodation, but only very little to light.

Treatment with derivatives was renewed, and his diet regulated. Galvanism and injections of strychnia seemed to me to be contra-indicated in this case.

For the next few months his condition remained at a standstill. His disposition was all the time buoyant and hopeful.

During the following spring there was another sudden decrease of the visual power of the right eye. On April 15th, S was found to be only $\frac{1}{16}$, and the visual field was narrowed to an area situated on the temporal side of the point of fixation, and extending from this point 30° above, 20° below, and 40° to the temporal side. Color was not recognized at all. On May 10, 1878, there was complete amaurosis.

His general condition all this time remained satisfactory. He even gained flesh steadily. His judgment and his mental powers generally showed no impairment, unless the indifference at the loss of his eyesight were to be considered a pathological phenomenon. By and by he began to exhibit a morbid egotism, and from a kind and considerate husband and father became a querulous and exacting tyrant. He endeavored to conceal his helpless condition, and always was highly gratified when told that his blindness had not been noticed by his friends. He never wavered in his hope of regaining his eyesight, and would often claim to be able to discern the passing clouds upon the sky while his eyes were directed toward the wall of the room opposite the window. He became very intolerant of contradiction, his excitement betraying itself by convulsive twitchings of both sides of his face. After a further lapse of several months he developed

extravagant notions about the extent of his means. He ordered ridiculous quantities of provisions, wine, and fancy articles, bought numerous gold rings for himself; and when he found that his wife opposed his lavishness he tried to induce the servants to write orders for goods without her knowledge. When asked, he always said that he felt exceedingly well. He was fond of company and of dinners, though his sense of taste was so much blunted that he could not distinguish wine from water. This did not prevent him, however, from praising indiscriminately every thing that was placed before him.

Both optic discs had a pronounced gray color, and were deeply excavated. The arteries were hardly discernible. Nystagmus now set in, the movements of the eyeballs being partly vibratory, and partly rotatory. The patient saw the most beautiful phosphènes; he only regretted that they changed so rapidly.

His *manie de grandeur* increased continually, and he became subject to erotic spells. He masturbated frequently, each act being followed by a condition of excitement lasting for hours. He ceased to show the slightest concern about his wife and children.

His sphincter muscles now becoming involved, though there was no other defect of motility, he was removed to the institution of Dr. Oebeke, in Eendenich.

One morning, after having been there only a short time, he was suddenly taken with convulsions and loss of consciousness, and died before the physician in charge arrived.

Autopsy twenty-five hours after death: Bones of the skull thick, with little diploë. Left side of cranial cavity larger than right. Dura mater adherent to skull. A large quantity of bloody serum in the arachnoid space. Pia mater can be detached only with difficulty, and is firmly adherent in the region of the left frontal lobe. This lobe is somewhat narrower than that of the right side. The right occipital lobe is shorter than normal, leaving part of the cerebellum uncovered. Left frontal and parietal lobes flattened. The substance of the cerebrum cedematous very soft. Both olfactory bulbs wider than normal. Optic nerves, chiasm, and tracts smooth, thin, grayish, and translucent. Cerebellum not quite so soft as cerebrum. Weight of brain including soft membranes 1,255 grammes.

In the foregoing case the following points are of interest:

(1) The early and simultaneous appearance of myosis in both eyes. (2) Atrophy of the left optic nerve was complete long before there was any implication of the right side. (3) Total amaurosis of both eyes remained for some length of time the only symptom of cerebral disease. (4) The atrophic condition of the right occipital lobe discovered at the autopsy.

This case showed the same symptoms which Vincent¹ describes as occurring in progressive paralysis. Among twenty-one cases of this affection recorded by him, in which useful sight was preserved, the reaction of the pupils to light and upon accommodative efforts was normal in three cases. In eleven cases the pupils contracted well during accommodation, but were only slightly affected by the stimulus of light. In the remaining number the reaction to light was completely abolished, whilst accommodative contraction remained normal.

The degree of hypermetropia of both eyes had probably been higher in youth than at the time of the first examination. This error of refraction had led to squinting and to the exclusion of the left eye from the act of vision. It would be difficult to decide whether the atrophy of the nerve of this side should be regarded as the consequence of this circumstance, or whether it was the first symptom of progressive paralysis.

There was doubtless a causative relation between the atrophic degeneration of the left optic nerve and that of the right occipital lobe, both having evidently taken a long time to develop.

The occurrence of complete amaurosis long before the development of any other symptom, in cases of general paralysis, has been described before by Westphal,² Wendt,³ and Wolff, whilst Albutt⁴ speaks of ophthalmoscopic changes as occurring only toward the end of the first stage of the disease.

¹ Des phénomènes oculo-pupillaires dans l'ataxie locomotrice progressive et la paralysie générale des aliénés. *Thèse de Paris*, 1877, p. 69.

² *Archiv für Psychiatrie*, Bd. i, p. 44.

³ *Zeitschrift für Psychiatrie*.

⁴ "On the Use of the Ophthalmoscope in Diseases of the Nervous System." 1877.

Unfortunately no microscopic examination of the brain has been made in this case. It would be especially interesting to know how far the atrophic degeneration of the cortical substance of the right occipital lobe had progressed, on account of the absence of hemiopic symptoms in the right eye.

According to Huschke¹ the normal weight of the brain between forty and forty-nine years is 1,406 grammes. In our case it was only 1,255, the difference being evidently due to atrophy of the right cerebral hemisphere.

¹Schädel, "Hirn und Seele." Jena, 1854, p. 60.

OCULAR LESIONS AFTER INJURIES OF THE BRAIN AND SPINAL MARROW.

BY DR. A. NIEDEN, OF BOCHUM, GERMANY.

(With two wood-cuts.)

Translated by Dr. A. SCHAPRINGER, New York.

I.—FRACTURE OF THE BASE OF THE SKULL ; AMAUROSIS OF THE LEFT EYE ; TEMPORAL HEMIANOPSIA AND PARALYSIS OF THE EXTERNAL RECTUS MUSCLE OF THE RIGHT EYE ; SUPPOSED PARTIAL RUPTURE OF THE CHIASMA.

Mr. Weustermann, a miner, æt. 28 years, was brought to my clinique August 29, 1881. The day previous, while working in the mine at the top of a steep ascent sixty metres high, he was struck on the left temple by a large rock which had become detached from the roof of the mine, and fell head-foremost the whole length of the declivity. He was picked up unconscious, bleeding profusely from the mouth, nose, and ears. During the night he vomited several times, and his breathing being stertorous, his friends expected him to die every moment. He survived, however, and even consciousness returned a short time before his admission. When spoken to in a loud voice, he gave short answers slowly but correctly, without, however, realizing where he was or what had happened to him, nor did he at first recognize his acquaintances. He complained of intense pain all over his head, and of continuous nausea. When not spoken to he would fall into a broken doze, moaning and muttering a great deal, and often touching his head with his hands.

The patient was a tall and powerfully built man. The left side of his face, which had been struck by the rock, showed extensive ecchymoses. The eyelids of this side were so much swollen that it was impossible to separate them in order to examine the eyeball.

The skin was abraded. No fracture of the skull could be detected by palpation, but percussion of the head gave the patient great pain. Both external auditory canals, as well as the nares, were filled with coagulated blood, on the removal of which the drum-heads were found to be intact, the patient still remaining hard of hearing and complaining of a roaring noise in his head, especially on the right side.

The right eyeball was found to be turned inward, owing to paralysis of the external rectus muscle. The background of the eye was normal. Approximate functional examination revealed central V to be perfect. On account of the drowsy condition of the patient the field of vision could not be determined. The reaction of the pupil was normal.

There was no disturbance of motility or sensibility of either trunk or extremities. The sphincters of the rectum and the bladder were not paralyzed. Temp., 38.2° Centigr.; pulse, 50 to 52.

The diagnosis of fracture of the base of the skull and paralysis of the right external rectus muscle was made. Ordered: Absolute rest and antiphlogistic treatment.

In the evening of the day of admission the temperature rose to 38.8° Centigr. Patient continued drowsy, answering, however, questions put to him in a loud voice. There was no recurrence of vomiting, but he moaned a great deal, and complained of intense headache and great thirst. From the moment of his admission polyuria was a marked symptom. During the first twenty-four hours he voided more than 6,000 Cc. of urine, the quantity of liquids taken during the same time being considerably less. The urine was clear, light-colored, devoid of smell, of a specific gravity of 1.002 or 1.003 and did not contain either sugar or albumen.

On the following day he was more conscious. He slept most of the time, but woke up almost every hour and asked for drink. Headache was less marked, and the swelling of the soft parts was subsiding.

On the third day the temperature was normal and remained so. The pulse was strong, but continued to be less frequent than normal. The quantity of urine secreted during twenty-four hours varied between 6,000 and 6,400 Cc., corresponding to the quantity of liquids imbibed; its composition remained the same.

For five days it was impossible to separate the lids of the left eye sufficiently to examine the condition of the globe. Then the

conjunctiva was found to be greatly swollen. The eyeball itself appeared to be uninjured and possessed of normal mobility. On testing the sight, it was found to be entirely abolished, there being no perception of light in any part of the visual field. On examination with the ophthalmoscope no changes were visible which could account for the total abolition of sight.

A few days later the visual field of the right eye was tested, and the temporal half discovered to be wanting, the nasal half only being preserved with normal S and color-perception. The line of demarcation, as shown in the diagram, passed through the

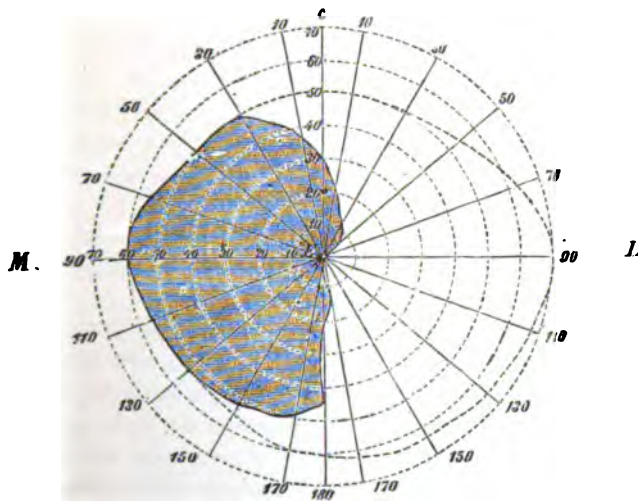


FIG. 1. RIGHT EYE.

The shaded part shows the extent of the field of vision preserved, the dotted line indicating the extent of the normal field of vision.

point of fixation, deviating a little from the vertical line both above and below. The inconvenience caused by the absence of the temporal half of the visual field was aggravated by the paralysis of the external rectus muscle of the same eye, which paralysis abolished the temporal part of the field of fixation. The patient endeavored to overcome to some extent the combination of these defects by habitually bending his head toward his right shoulder.

His general condition improved. Thirst and polyuria continued for a week, and were not influenced by large doses of opium, which were otherwise well borne. Headache and drowsiness decreased, the intellect became quite clear, but the patient still

could not remember any thing connected with his accident.

The swelling of the left side of the face and the chemosis having gradually subsided, the eye at last could be freely opened. The pupil was of normal size, and contracted promptly during efforts at convergence and whenever light was thrown into the right eye.

Patient still complained of a roaring noise in his head, especially on the right side. When in an erect position he suffered from intense pain along the course of the right sciatic nerve. In walking he dragged his right leg, like one whose extensor muscles are paralyzed. Both innervation and contractility of the muscles proving to be unimpaired, the patient's limping was evidently due to the pain in the limb only. The sensibility of the skin was normal and equal on both sides of the body. The patellar and Achilles tendon reflexes were also normal. The pain in the right lower extremity was caused by hyperæsthesia and neuralgia of the sciatic nerve, which was aggravated by motion, but annoyed the patient even at times when he kept quiet.

The galvanic current was used without bringing any relief. The reaction of the muscles to its application, as well as to that of the faradic current, was normal.

During the next few days the pain increased so much that the patient could not leave his bed, and hypodermic injections of morphia had to be used freely. It was thought that, at the time of the accident, the sciatic nerve had possibly been bruised. A close inspection of the parts, however, did not corroborate this supposition. The patient was then put on antirheumatic remedies—such as soda salicylate and iodide of potassium, but with a negative result. After the lapse of another week the pain began to subside, and from that time his general condition continued to be satisfactory. The quantity of urine decreased to 5,000 Cc. per day, its chemical composition remaining unchanged.

The amaurotic condition of the left eye persisted. Efforts at fixation with the right eye caused the left eye to make rapid oscillating movements about its vertical axis.

The power of hearing on the right side was completely abolished and remained so subsequently; on the left side it was found slightly diminished. The headache ceased entirely. The thirst abated somewhat under the influence of electricity, which was now being applied through the head. The urine continued to decrease to about 4,000 Cc. His mind was quite clear, but he seemed to be somewhat slow of perception. It always took him some time

before he would answer a question, but the answers were always correct, and he never made use of a wrong word. He complained of his memory being weak, and especially that he could not remember the circumstances of his accident.

Six weeks after his admission the first signs of beginning atrophic degeneration of the left optic nerve exhibited themselves. The inner half of the disc became white, and the arteries showed a diminished calibre. There was no change visible in the interior of the right eye. Its field of vision was examined repeatedly, and always with the same result, with the exception of very slight deviations of the line dividing the preserved from the missing portion.

The urine decreased to 3,500 Cc ; the thirst was very moderate, the general condition satisfactory. He was discharged October 16, 1881.

The atrophic process of the left optic nerve progressed. Ten weeks after the accident the inner upper quadrant of the right optic disc began to show white discoloration, but the calibre of the vessels did not diminish. The external rectus muscle began to regain its power without any treatment whatever, and in the month of December the eyeball could be rotated outward far beyond the middle line. Consequently he did not turn his head toward the right shoulder as much as before. There was little thirst, and the quantity of urine varied between 2,000 and 2,500 Cc. The function of the right ear remained completely abolished, that of the left ear was only impaired by the tinnitus.

Six months after the accident had happened the patient had regained his usual weight and seemed in good health, but still complained of his eyesight. The left eye was still amaurotic, with marked atrophy of the optic nerve. Efforts at convergence caused oscillating movements of the eyeball, the pupil, however, contracting well. The field of vision of the right eye was the same as before. The paralysis of the right external muscle completely disappeared, but the patient persisted, nevertheless, in the habit of bending his head toward the right shoulder on account of the absence of the temporal half of the visual field. He did not complain of thirst any longer. The quantity of urine varied between 1,500 and 1,800 Cc. Its color was darker, and its specific gravity 1.008. He worked at his trade again though not steadily.

Epicritical Remarks.

If we take into consideration the nature of the injury, the hemorrhage from both ears, the complete loss of hearing on one side, and the grave cerebral symptoms which followed, the diagnosis of fracture of the base of the skull appears to be established beyond any doubt.

The total abolition of sight in the left eye, and the temporal hemianopsia of the right could have been caused by a lesion of the optic tracts, or the chiasma, or the optic nerves. The lesion was evidently of such a character as to lead to the complete destruction of the nerve-fibres, causing the atrophy shown by the ophthalmoscope.

It would seem improbable that the left optic tract in its entirety, and *exactly one half* of the right tract, should have been severed.

Another supposition would be that the left optic nerve and the inner half of the right nerve were implicated in the destructive lesion, but this hypothesis also seems to me to be untenable. In either case, if the lesion had been in front of or behind the chiasma, other parts besides the right abducens nerve would have necessarily been implicated.

The only way to explain the disturbances of vision is to assume that the chiasma itself was the seat of a lesion, all the fibres composing it being severed with the exception of the right lateral fascicle.

The visual phenomena might further be explained by pressure upon the chiasma of blood extravasated in the third ventricle and in the recessus. The blood passing through the aquæductus Sylvii into the fourth ventricle would there affect the nucleus of the right abducens nerve as well as the centre of diabetes. There is, however, this objection against such a theory, that it would not explain why only three fascicles of the chiasma, viz., the fasciculus cruciatus and lateralis of the left side and the fasciculus cruciatus of the right side, should be affected, and the right fasciculus lateralis escape. Besides, mere compression would hardly cause the complete and permanent loss of function observed in our case. If the paralysis of the right abducens nerve

had been caused by compression of its origin in the floor of the fourth ventricle, the nuclei of the fifth and seventh nerves would not have escaped implication. It is more simple to bring the lesion of this nerve in connection with the abolition of the hearing power of the same side, and to explain both by a fissure extending from the middle of the sphenoid into the petrous portion of the right temporal bone, implicating that part of the abducens nerve of the same side which passes through the cavernous sinus.

It is by no means necessary to assume a lesion of the floor of the fourth ventricle to explain the diabetes, since there are on record many cases of diabetes occurring as a brain symptom, where the fourth ventricle was found free from disease. For instance, in the case published by Dreschfeld (*Centralblatt für Augenheilkunde*, vol. iii, p. 33), the following symptoms were observed during life: amaurosis of the right eye, complete temporal hemianopsia of the left eye, central S of left eye = 1, diabetes insipidus, paralysis of the right oculomotor, abducens, and trochlearis nerves. At the autopsy the right side of the chiasma was found to be converted into carcinoma, but the floor of the fourth ventricle was entirely intact.

Wilbrand¹ has collected 76 cases of hemianopsia with and without autopsies. In five of these cases diabetes insipidus was present. In three of the latter a tumor was found situated in the posterior angle of the chiasm, and in the other two on its side. It is known that tumors situated between the posterior angle of the chiasm and the pons are often accompanied by diabetes. Besides the five cases of diabetes insipidus, there were three cases of diabetes mellitus; altogether diabetes was present in eight cases or 10.5 per cent.

While the proof-sheets of this case were passing through my hands, I met with another case of injury to the skull, which presented symptoms so similar to the one just narrated that I take the liberty to append a short account of it.

Mr. Stein, a miner, æt. twenty-five, was struck on his head by a heavy piece of coal falling on him on May 23, 1882. There was

¹ "Über Hemianopsie und ihr Verhältniss zur topischen Diagnose der Gehirnerkrankheiten. Berlin, 1881, p. 88.

a wound of the scalp extending in a horizontal direction across the entire width of the occipital bone ; also fracture of the right forearm, dislocation of the right thigh-bone, and all the symptoms of fracture at the base of the skull. The patient recovered, and was presented to me August 1, 1882. I found complete amaurosis of the right eye. The pupil of this eye was of medium size, and contracted when the eyes converged, or when light was thrown into the other eye. The eyeball made oscillating movements during efforts at fixation. On the left side there was complete paralysis of the external rectus muscle ; $S = \frac{1}{4}$. The field of vision was narrowed concentrically. In the temporal half of the field there was only slight perception of light between the vertical line passing through the point of fixation to a line situated 32° to the outer side of it. In the nasal part of the field the white square was recognized up to 45° . Normal S and color-perception were preserved only in a small part extending about 15° in a downward and inward direction from the point of fixation. With the ophthalmoscope the right optic disc was found completely atrophied, but the left was normal in all respects. The hearing of the left ear was gone. Besides this there was no other disturbance either of sensibility or motility. There had been great thirst in the first few weeks after the accident, but the urine had not been examined.

The analogies of the two cases are obvious. There is almost no difference, except that the lesions have changed sides. The conclusion is forced on us, that the nature of the lesion at the base of the brain in this case was similar to that in the one first detailed. The destruction of the chiasm, however, must have been greater in the latter patient because the field of vision left was much smaller.

II.—PERFORATING WOUND OF THE LEFT TEMPORAL BONE ;
PARALYSIS OF THE LEFT ABDUCENS NERVE ; RIGHT-
SIDED HEMIPLEGIA WITHOUT LOSS OF SENSIBILITY ;
SENSORY APHASIA.

Mr. Pothoff, a miner, æt. twenty-four, consulted me on Jan. 15, 1882, for a squint of his left eye.

On October 30, 1881, he had been attacked by roughs and stabbed in the left temple with a jack-knife. He fell to the

ground unconscious and was picked up a few hours later. Next to him, in a large pool of blood, lay the knife with which he had been injured, its point unbroken.

He was seen by a physician, who found him unconscious and with stertorous respiration. Midway between the left superciliary arch and the auricle of the same side there was a wound running in a vertical direction for about 3 *cm.*, with clean-cut edges. A line drawn from the top of the superciliary arch to the tip of the auricle would divide the wound into two unequal parts, the upper one being the larger. The edges were glued together. Examination with the probe revealed the fact that the squamous portion of the temporal bone had been penetrated, but the probe could not be passed through the fissure of the bone. The patient kept his eyes closed spasmodically, not reacting when spoken to, but moaning occasionally, and putting his left hand to his head as if suffering pain there. There was no involuntary discharge from the bowels or the bladder. The wound having been cleaned and stitched together, ice was ordered to be applied to his head.

After some hours he would mutter a few incoherent words, apparently whenever he had a paroxysm of pain or when he desired to urinate. Neither the tongue nor the muscles of the face were affected in any way, but it soon became apparent that he had lost the power of using the lower as well as the upper extremity of the right side; the sensibility of which parts, however, was preserved.

Later on the patient opened his eyes when spoken to, though only to stare about wildly without recognizing anybody. His answers were incoherent, though the pronunciation of the words was correct. At this time it was noticed that he would use the same words to express entirely different things, as, for instance, when he desired to micturate and when he wanted some water to drink. Mastication, deglutition, and defecation were normal. Most of the time he was in a state of stupor, occasionally muttering unintelligibly.

The wound healed *per primam* within three days. He ceased to moan, but the paralysis of the right side remained. When he finally opened his eyes the left was found to deviate strongly toward the nasal side. His consciousness not having yet returned, it was not possible to accurately examine the function of the ocular muscles, but by turning his head to one side and attracting his attention from the other, it could be made out beyond doubt that

the left external rectus muscle was completely paralyzed. The pupil of this eye reacted normally.

Consciousness did not return until the end of the third week, when he began to answer questions slowly and hesitatingly, often using wrong words. His memory was very deficient, especially regarding the circumstances of his accident. The headache decreased. While he regained the use of some of the muscles of the lower extremity slowly, the arm remained limp and useless. The left eye could not be moved outward beyond the middle line. He kept this eye closed most of the time, and did not complain of double images. A superficial examination of S was made and it was found to be normal. The appetite and the general condition of the patient were satisfactory.

On Dec. 8th he left his bed. The right leg improved rapidly, and in the course of a week he was able to walk about unaided. Under treatment with the electric current, which produced violent contractions in the muscles of both the upper and lower extremities, his right arm also began to improve, whilst the paralytic squint of the left eye remained stationary. His ideas began to form more rapidly, and he had less difficulty in finding the proper words to express them. He slept well. After the lapse of another four weeks the use of his right arm and leg was restored, and he came to consult me about his squinting left eye.

I found complete paralysis of the left external rectus ; S = 1. By the use of colored glasses double images could be produced in the ordinary way. The fundus of both eyes was normal. The acts of ideation and volition were retarded. There was loss of memory for recent events, and occasionally also for certain words. There was still some paresis of the muscles of his right upper extremity, and some stiffness in several of its joints. He dragged the right leg slightly, and it inconvenienced him somewhat when he attempted to turn his body rapidly. The sensibility of the extremities of the right side and the patellar reflex were normal. So were also the facial muscles. The movements of the tongue and deglutition were perfectly free. The cicatrix over the left temple was adherent to the bone, not sensitive to pressure. Percussion of the skull was not painful. Patient kept his left eye closed most of the time, had no vertigo, and was able to do light work. The condition of the left eye did not change.

It would seem rational to advance the external rectus muscle of this eye in order to diminish the deviation.

Epicritical Remarks.

In this case there was a direct injury of the skull and the brain in the region of the left temporal lobe. The knife with which the injury had been inflicted perforated the upper part of the squamous portion, and was withdrawn with its point uninjured. From this we can infer that the blade did not enter the skull cavity to any depth, and that the opening in the bone was considerably smaller than the external wound, which must have been enlarged by to-and-fro movements of the knife while it was being withdrawn. The sudden unconsciousness which could only be produced by compression of this part of the cerebrum, might be explained by hemorrhage from one of the meningeal vessels running over the inner surface of the squamous portion of the temporal bone.

The absence of paralysis of the tongue, face, and pharynx, and the preservation of the sensibility of the paralyzed extremities, however, militate against the assumption of an extravasation in the region named. The complex of symptoms exhibited by the patient points rather to a direct injury of that part of the cortex comprising the *gyri centrales* and the paracentral lobule, which region is known to be the motor centre of the extremities. In order to produce such

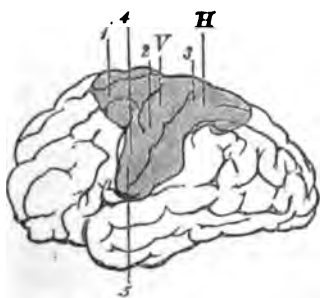


FIG. 2. (AFTER ECKER.)

- H — Posterior Central Convolution.
 - V — Anterior " "
 - 1 — Centre of Oculomotor Nerve.
 - 2 — " " Upper Extremity.
 - 3 — " " Lower " "
 - 4 — " " Facial Nerve.
 - 5 — " " Hypoglossal Nerve.
- The dark portion represents the Motor Area.

a lesion, the direction of the knife must have been from below upward, its point glancing along the inner aspect of the squamous portion for some distance before touching the cortex. This hypothesis is corroborated by the temporary loss of word-memory, the centre of which is generally supposed to be located in the posterior part of the third frontal convolution. No centre has as yet been found in the cortical substance for the abducens nerve, by clinical or experimental investigation, though centres have already been found for the oculomotor, the facial, and the hypoglossal nerves. The paralysis of the sixth nerve in our case must, therefore, remain unexplained for the present. There is every reason to expect that a cortical centre for this nerve will soon be discovered in the region of the motor area.

According to Nothnagel,¹ paralysis of the extremities of one side, associated with paralysis of the abducens nerve of the other side, has been observed in connection with lesions of the lower part of the pons, near the medulla oblongata, but in this case an implication of that locality could not be thought of.

III.—CONCUSSION OF THE BRAIN AND SPINAL MARROW; SLIGHT INITIAL SYMPTOMS, FOLLOWED BY PROGRESSIVE SPINAL ATAXIA, EXOPHTHALMUS OF BOTH EYES, AND ATROPHY OF BOTH OPTIC NERVES; SLOW IMPROVEMENT OF GENERAL CONDITION.

Mr. Strathmann, aged nineteen years, was one of a party of six miners, who were being lowered down the shaft of a mine, Jan. 2, 1878, when, owing to some mistake of the engineer, the car was hurled to the bottom of the shaft, and its occupants thrown violently against each other and against the walls of the car. Blood oozed from mouth and nostrils, and he fell unconscious. He was brought to the surface, where the oozing soon stopped, but his whole face became considerably swollen. With the exception of a slight laceration in the region of the left knee, no external injury was visible. He soon recovered consciousness, and in spite of aching pains in his limbs was able to walk home unaided. In a few days, during which he kept

¹ "Topische Diagnostik der Gehirnkrankheiten." Berlin, 1879, page 551.

himself quiet, his general condition improved. The swelling of his face decreased, the wound of his knee healed, and at the end of three weeks he was able to resume light work ; but he could not bend his head strongly either forward or backward without experiencing pain in his occiput, vertigo, and nausea. This symptom grew worse slowly, and soon he would become so dizzy with every sudden motion of his head forward or to the side, that he had to grasp the nearest object in order to save himself from falling. The nausea accompanying the vertigo increased. When vomiting occurred he felt relieved, and could soon resume work. Retaining an erect posture for some length of time produced a growing sense of weakness in his back, with occipital headache and nausea, which symptoms disappeared when he lay down.

In this condition he remained for about nine months. In the month of September, 1878, the pain in the occiput became more violent and recurred more frequently, finally leaving him only while he lay in bed. About this time he began to be annoyed by alternating spells of heat and cold, which seemed to originate in his back, travelling thence through his chest to his limbs. These spells were not accompanied by any unusual amount of perspiration.

The feeling of weakness in the back during erect posture continued to increase. The slightest jarring of his body, even that produced by quiet, slow walking, caused disagreeable sensations in his head. He usually held his head backward.

During the month of September he noticed that the sight of his right eye began to fail. His physician, to whom he presented himself again, for the first time after a lapse of eight months, now noticed that both his eyes protruded from their sockets, and sent him to me.

When I saw him on the 18th of Dec., 1878, he was not able to walk without assistance. The motions of his legs were jerky, like those of persons suffering from locomotor ataxia. If he attempted to stand alone, his knees would give way immediately, and he sank to the floor. Owing to the protrusion of the eyeballs, which was moderate in degree and equal on both sides, the expression of his wan and sallow face was peculiar. His upper lids, which he moved very infrequently, lagged behind when he looked downward, leaving a considerable portion of the sclera exposed. There was considerable lachrymation. The motility of both eye-

balls and pupils was normal, and the bulbi could easily be pressed back to their normal position. Even slight exertion caused profuse perspiration on his forehead, while his whole face became bloated. He had intense pain in his occiput, and nausea whenever he attempted to stand up or walk, and actually vomited when he persisted in the attempt. His head was bent backward, his spinal column remarkably straight, the normal curvatures being almost obliterated, and he was rather sensitive to strong pressure exerted anywhere along its course, but there were no special painful spots. Even if held on both sides, he could hardly stand up with his eyes closed.

While in the recumbent posture, he could move his legs freely. The patellar reflex was entirely abolished on the right side, and nearly so on the left. The sensibility of the skin of the chest and the extremities was normal. Headache, vertigo, and nausea supervened even in the recumbent posture, whenever the head was raised to a higher level than the body. These unpleasant symptoms disappeared promptly when the head was lowered. The functions of the intestines were undisturbed. He had occasional spells of dyspnœa, accompanied by increased frequency and shallowness of respiration, and accelerated pulse. There was no goitre, and the heart-sounds were normal.

The visual acuteness of the right eye was $\frac{1}{10}$, that of the left $\frac{1}{2}$. The ophthalmoscope revealed white discoloration of the inner half of the right optic disc and attenuation of the arteries. The vessels of the left optic disc were of a normal calibre, but the lower inner quadrant began also to show white discoloration. In the right eye a great portion of the outer half of the field of vision was wanting, while in the left the area of the upper outer quadrant was narrowed.

The treatment instituted consisted of the galvanic current along the spinal marrow, and rest in bed. The dyspnœa was controlled by bromide of potassium.

About the middle of January, 1879, he was able to sit up in his bed for some time without a recurrence of either headache or vertigo. The exophthalmus as well as the amblyopia remained stationary. The condition of the pupils continued to be normal. He could read for a short time, the accommodative power of his left eye soon giving out.

His general condition continued to improve during the course of the next few months. He never complained of a sense of con-

striction around his body (*Gürtelgefühl*). He began to walk about the room, staggering, however, considerably.

In the course of the summer, 1880, I again examined his right eye, the sight of which had been growing worse, and found the atrophic changes of the disc more marked than before; posterior polar cataract, $S = \frac{1}{8}$, slight divergent strabismus, exophthalmus somewhat less. In the left eye the condition of the fundus, of S, and of the visual field had not changed.

The symptoms of incoördination were more marked in the right leg than in the left, just as the disturbances of vision were more prominent in the right eye than in the other. With his eyes open the patient could balance himself for a few seconds on his left leg, but not for a single moment on his right. The sensibility of the skin, the motility of the face and of the upper extremities, were normal and equal on both sides of the body. He still carried his head well backward, and his spine, over which there were no painful spots, stretched in a straight line, and suffered less often from headache and vertigo.

In the month of May, 1881, he had so far recovered that he could walk from his residence to my office, a distance which ordinarily takes three quarters of an hour to walk. He became considerably exhausted, however, his right leg trembling violently and making a jerk every time it was put forward. The exertion also made his eyes more prominent than usual, but otherwise the exophthalmus had not increased of late. The upper lids moved more freely than before, following the eyeballs when these were rotated downward. The peripheric zone of the right visual field had become uniformly contracted, and therefore the general outline of the fields less irregular, and the defects of the outer upper and lower quadrants less noticeable. The atrophic condition of the nerve, as well as the posterior polar cataract, was found *in statu quo*; S was still $= \frac{1}{8}$. In the left, S was $= \frac{1}{8}$ as before, though the white discoloration of the disc had increased, the calibre of the vessels, however, having remained the same. The temporal part of the visual field had been decreased by several degrees. When he attempted to look at an object steadily, the eyeballs made rotatory movements, as in nystagmus. These nystagmus-like motions were more feeble and less rapid when the point of fixation lay to the right than when it lay to the left of the median plane. When he looked into space, the right eye deviated a few millimetres to the temporal side. The condition of the pupils was

normal. The power of accommodation of the left eye had improved considerably, so that he was able to read fine print for quite a time without fatigue. His digestion was good, his mind so clear that he was able to write a history of his case. His occipital headache troubled him only when he coughed or sneezed. The dizziness had left him entirely. The ataxia of the legs had remained, but the difference of the two sides had become less noticeable. There was no loss of sensibility anywhere.

Epicritical Remarks.

This was a case of severe concussion of the whole length of the spinal column and its contents. The hemorrhage from the nostrils and mouth and the swelling of the face were evidently not connected with the main injury, and their significance was unimportant. The man, returning to his usual occupation, was able to follow it for months before he was forced to stop by a general feeling of weakness, aching in his limbs, especially the lower extremities, inability to maintain the erect position for any length of time, and violent occipital pains with periodical exacerbations. These were followed by a complex of symptoms resembling locomotor ataxia. All these phenomena are explained by a molecular disturbance of the nervous elements of the spinal marrow caused by concussion; this disturbance being greater on the right side than on the left, as the subsequent preponderance of the symptoms on that side showed. The sensitiveness of the spinal column to pressure, and the peculiar way in which the patient stretched it to a straight line, and bent his head while he walked, point to a general distortion of all the articulations in the vertebral column. The slow development of the case and the absence of febrile disturbance exclude the possibility of inflammatory changes.

The experiments of Rieger and Von Forster¹ prove that irritation of the spinal marrow is followed by dilatation of the retrobulbar as well as of the intra-ocular vessels, which fact explains the exophthalmus in our case as well as the changes of the optic nerves. The patient's eyes not

¹ *Graefe's Archiv f. Ophthalm.*, Bd. xxvii, 3, p. 109.

having been examined until a long time after the accident, I do not know whether the atrophy of the discs was preceded by a hyperæmic stage or not, but it very probably was. This supposition is corroborated by the history of other symptoms of vaso-motor disturbance, such as excessive perspiration, palpitation of the heart, and vertigo, which was evidently due to hyperæmia of the brain.

The favorable progress of the case generally indicates that no destructive process was going on in the elements of any of the nerves affected, with the exception of the optic nerves.

A CASE OF ECTOPIA OF THE EYEBALL BY OSTEO-PHYTES FROM THE ROOF OF THE ORBIT, WITH CONSECUTIVE PNEUMATOSIS OF THE SUPRA-ORBITAL REGION.

BY DR. ALOIS BIRNBACHER,
LECTURER ON OPHTHALMOLOGY IN GRATZ, AUSTRIA.

(See figs. 1-5, plates vii and viii.)

Translated by Dr. J. H. SHORTER, of New York.

I HAD an opportunity to observe a patient, and to operate on him with success, whose right eyeball was displaced down and outward from its normal position by osteophytes growing from the upper wall of the orbit as a sequence of disease of the frontal sinus, under which, later, through absorption of the walls of the frontal sinus, an emphysematous tumor appeared in the region of the eyebrow.

In the literature which is accessible to me I have not found a similar case, therefore I regard a full description of this one as indicated, and in the following will give the history of the disease and operation, and the result of the microscopic examination of the growths removed in the operation, on which is grounded the diagnosis.

A. Farching, seventeen years old, candidate for professorship, had, according to statement of his mother, suffered with hydrocephalus, which was confirmed by shape of the skull. He learned to walk at twenty months of age. Otherwise he had not experienced any severe illness. He had always enjoyed good sight.

During the latter months before he presented himself the patient suffered frequently with a dull frontal headache ; but the

forehead and supra-orbital border were never sensitive on pressure; and, as he stated, there had never been any thing peculiar to remark in or about the right eye.

The protrusion of the right eyeball was first noticed by his colleagues.

When patient presented himself, 12th April, 1881, I noticed the following condition :

The right globe protruded. The difference in apices of the corneas amounted to about 5 *mm*. Nothing abnormal to be observed in lids, conjunctivæ, or external parts of visual organs. The excursion of the right eye was as free as that of the left. $V = \frac{3}{8}$, $H = \frac{1}{4}$, in each eye. This refraction was verified by ophthalmoscope.

The visual field, both in peripheral extent and in area, was on both sides normal as well for colors as for white. The ophthalmoscope showed clear media and normal fundus.

Beyond this I noticed nothing in examination of the patient, excepting the marked rachitic shape of upper and lower incisors, and the hydrocephalic form of the skull.

I restricted myself at first to recommend to the patient to drink the iodine waters of Halle.

On 7th September saw him again. At first superficial view the exophthalmus seemed to have subsided. A comparison, however, of the position of the corneal apices, measured over root of nose, showed that it remained about in its former degree, and that the impression that the globe again occupied its normal position in the orbit was produced by a thickening of the upper border of the right orbit which had taken place especially about the middle part.

This thickening prevented the sharp edge of the roof of the orbit from being as distinctly felt on right side as on left. On pressure, neither this place nor its neighborhood was sensitive; the skin overlying it was entirely normal and freely movable. Functional examination and ophthalmoscopic condition about as in April.

October 12th.—The upper border of right orbit generally thickened and rounded off. In the region of the notch can be felt a sharp-edged, boat-shaped depression, about 2 *cm*. long. The globe showed, in addition to the exophthalmus, which remained about the same, a noticeable displacement downward. R. E., $M = \frac{1}{8}$; L. E., $H = \frac{1}{4}$. $V = \frac{3}{8}$, both eyes. Ophthalmoscopic

condition normal. Restriction in movement of right eye not demonstrable. No diplopia.

November 18th.—The sharp-edged excavation noticed in the thickened edge of the upper border of right orbit has reached a length of 3 *cm.* It ends laterally, about where the ext. angular process of the frontal bone goes over to the malar bone. Its posterior boundary is no longer to be felt; seems to have disappeared into the roof of the orbit. Six *mm.* from the lateral end of the above depression, inward and upward, a small hard ridge-shaped body can be felt on its sharp edge projecting downward, which seems a growth from the anterior surface of the frontal bone. The outward movement of right eye a little restricted.

January 4, 1882.—The little ridge-shaped projection has increased 4 *mm.* in length; inward from it a similar elevation can be felt perceptibly. The exophthalmus remains unchanged. The downward displacement of eyeball has increased. Excessive lateral movements of globe are painful.

February 12, 1882.—Patient states that two days before, while sneezing forcibly, a swelling suddenly appeared under the right eyebrow, which disappeared during the night following. He experienced no pain from it. On making the patient expire strongly with mouth and nose closed, a small flat, spindle-shaped swelling appears under the edge of the eyebrow. This swelling presents a smooth surface and distinct boundaries, feels elastic, and the skin can be raised in folds over it.

By pressure and rubbing the swelling can be made to almost entirely disappear. It is then perceived that the ridge-like projections of bone mentioned before have increased in length downward. They present now the feeling of plugs about 3 *mm.* wide, which with their rounded-off ends are only distant $1\frac{1}{2}$ *mm.* from the globe. Inspection of upper fornix conjunctivæ shows no projection. The percussion sound from the swelling and the supra-orbital region is tympanitic. $V = \frac{3}{4}$ both sides. R. E., $M = \frac{1}{16}$; L. E., $H = \frac{1}{16}$. The tension of right eye seems perceptibly increased. Field and ophthalmoscopic condition normal. On looking strongly to right there are homonymous double images. The swelling can be produced at will by the before-mentioned manœuvre; by so doing, the right eye is moved 2 to 3 *mm.* downward.

February, 14th.—The swelling can still be always produced by forced, impeded respiration. It reaches somewhat farther in-

ward, and has greater width. On its being pushed away, the hard bony pegs can be distinctly felt through the skin.

February 20th.—The displacement of globe forward and downward has increased. The emphysematous tumor reaches now 5 mm. above upper border of orbit, outward to a vertical line drawn through outer canthus upward. $V = \frac{1}{2}$, both sides. R. E., $M = \frac{1}{16}$; L. E., $H = \frac{1}{16}$. Tension considerably increased. Field and ophthalmoscopic condition normal.

March 3d.—For a few days past, the swelling has remained stationary, and no longer diminishes under pressure or rubbing. The percussion sound over it still full-tympanitic. The upper boundary of the swelling forms a curved line, which begins at the supra-orbital border above the outer canthus, reaches its highest point 5 mm. above the middle of the eyebrow, and extends inward to a point straight above the lachrymal sac. Downward the tumor stretches to the middle of upper lid, where a superficial transverse fold of skin marks its lower boundary.

March 14th.—An exploratory puncture, in which the needle of the syringe encountered considerable resistance, discharged only air, and even by suction no other contents could be obtained.

The swelling was so much diminished by the puncture, that the upper border of the orbit could be easily explored. By this it was perceived that from the point where the frontal joins the malar bone, the border was thickened and scooped out as if by a chisel. Three mm. from the lateral border of this excavation, inward and upward, was felt a smooth, hard peg-like body, projecting about 5 mm. from the border of the bone above. At a distance of 3 or 4 mm. to the nasal side, a second peg-like body, 11 mm. long and 3 mm. wide, projects downward parallel to the first; 3 to 4 mm. still farther to the nose, there is a third, about 12 mm. long and 5 mm. broad at its origin from the frontal. These three projections are firmly attached to the bone.

The lower end of the middle peg displayed a slight cartilaginous elasticity. The longest, most inward peg reached directly to the equator of the globe. The globe is crowded to the lower wall of the orbit. The lower border of right orbit seems perfectly intact and entirely symmetrical with that of left.

The exophthalmus amounts to 7 mm; the vertical difference in positions of apices of corneæ, 9 to 10 mm. The excursion of right eye downward and outward, in slight degree painful and restricted. $V = \frac{1}{2}$, both sides. R. E., $M = \frac{1}{16}$; L. E., H

= $\frac{1}{2}$. Right eye : tension markedly increased ; ophthalmoscopic condition normal. Upper section of right bulbar conjunctiva somewhat injected. Pupils equally dilated ; reaction correct. Sensitiveness of skin of forehead same on right as on left half. In order to avert any further peril to the eye from the bony projections which are growing downward, I recommended to the patient their removal by operation.

On 2d April I undertook the operation at the surgical clinic of Prof. Von Rzehaczek, and with his kind assistance.

After patient was anæsthetized, the skin of the forehead was stretched upward, and an incision made through the skin and subcutaneous cellular tissue, directly under and along the lower border of the eyebrow, commencing at outer angle of the orbit, and reaching nearly over the upper border of the lachrymal sac.

As I reached the periosteum in the region of the upper orbital border, I saw it stretched and somewhat arched over a darkly translucent cavity. I made section of the periosteum in full length of the cutaneous incision, and detached it for a width of 3 mm. from the frontal bone above.

With this the above-mentioned cavity was opened. As its contents, I found, besides air, two larger ridges and one smaller, of reddish-gray-colored spongy bone, which projected downward against the eyeball. These ridges had their origin in a mass of fine spongy bone which formed the roof of the orbit ; they extended 2 cm. into the depth of the orbit, and formed therein a comb, over which the periosteum of the roof of the orbit was stretched in such way that it came in conjunction with the bone substance only at the lower free border of this comb. The periosteum constituted the floor of the pneumatic cavity described. The top and sides were formed in shape of a vault of rough and spongy bone, from which the above-described combs projected like stalactites.

The three bony combs were loosened and removed by the chisel. Now, as the finger was forced into the cavity along the floor, it felt that the periosteum, which had been stretched over the combs of bone that were removed, contained small hard plates of bone enwoven in it, which with low bare ridges stood forward somewhat into the cavity. I dissected carefully these pieces out of the periosteum. On pressing still deeper into the cavity, the finger came in contact along the roof with still greater numbers of large and small comb- and peg-like bony outgrowths, which

sprang out from the spongy frame work of the roof of the orbit. These were also removed with the chisel, in which, as in removal of the three bony combs, I was astonished at the softness and lack of resistance of the bony substance.

Notwithstanding I pressed very deeply in the direction of the frontal sinus in the exploration described, no separate bony cavity was found which could be regarded as a frontal sinus. Equally little did I succeed in passing a probe through the spongy roof of the orbit into the nasal cavity.

After all remaining unevenness of the covering of the cavity had been, so far as possible, smoothed off with a sharp scoop, leaving as roof of orbit a somewhat smooth-bordered mass of porous bone, the globe could be replaced into its normal position. After careful cleansing of cavity with a two-per-cent. solution of carbolic acid, the edges of periosteal incision were brought together with cat-gut sutures as far as the inner angle of the wound, where a drainage-tube was left. The outer cutaneous incision was closed with silk as far as the drainage-tube. The patient remained for after-treatment in the surgical clinic.

April 3d.—First change of bandage.

April 4th.—Removal of the cutaneous sutures and drainage-tube. The wound of skin for most part healed by first intention. A quantity of healthy-looking pus discharged from inner angle of wound. From this time on a change of bandage twice a day. Most of secretion of good-looking pus; no fever, no headache. A preliminary test shows that the functions of the right eye are perfectly preserved.

April 10th.—Patient discharged with simple protective bandage, and placed in out-door department. In inner angle of wound there remains a fine fistulous opening, out of which pus still discharges.

May 12th.—The opening at inner angle of wound closed by crusts. The upper lid swollen and œdematous. After removal of crusts, pus escapes from the fistulous opening.

June 14th.—The wound entirely healed. On the right upper lid, 5 mm. under and parallel to the eyebrow, can be seen a fine rose-colored scar, whose inner end is united to the bone. The upper orbital border is somewhat rounded off and more arch-shaped than the left. The surroundings of the eye entirely normal; the closure of the lid perfect. The right eyeball is of same height as left; the exophthalmus entirely gone. V = $\frac{1}{2}$, both sides. R.

E., $H = \frac{1}{34}$; L. E., $H = \frac{1}{34}$. The visual field of both eyes entirely congruous. Sensibility of skin of forehead shows no difference between the two sides. Forced expiration, with nose and mouth closed, does not make any perceptible change in neighborhood of right orbit.

I saw patient for last time on 28th Dec., 1882. The scar had grown paler; otherwise *status idem*.

Finally, before going into the pathogenesis I will say a few words as to the change in refraction occurring in the right eye during the course of the disease.

As is seen from the above data there was, during the disease, a constant increase of refraction in the diseased eye, from $H = \frac{1}{34}$ to $M = \frac{1}{30}$. That this increase was produced by the elongation of the optic axis caused by pressure on the globe from above downward by the bony ridges, is little to be doubted, as the original refractive condition is seen to re-establish itself as soon as these ridges are removed.

Making calculation of the increase of the optic axis during the course of the disease: given that for $H = \frac{1}{34}$, there is a shortening of the axis 0.45 mm. in comparison with the emmetropic eye, and for $M = \frac{1}{30}$, a lengthening of the same of 0.38 mm. in comparison with the emmetropic eye, we have an increase of optic length of 0.83 mm.

Increase in refraction of the eye, conditional on lateral pressure from orbital cellulitis, has been observed by Tavignot; from tumor of orbit, by Galézowski; finally, in erysipelas faciei by Cuignet. Still it may not be unimportant to especially lay stress on this condition, for in our case the constant increase of refraction until the operation, and its return to original condition after it, could be established by exact subjective and objective experiments.

In order to have light on the before-mentioned case, the pieces of bone removed by the operation were subjected to microscopic examination, and I will now in the following pages call attention to the results of this examination; and then, from this and the course of the disease as a basis, I will endeavor to determine the pathogenesis.

For purposes of microscopic examination the combs and plates of bone, mentioned in description of the operation,

were laid in Müller's fluid and kept immersed until they no longer offered any especial resistance to the section-cutter. The pieces of bone, after removal from Müller's fluid and hardening in alcohol, were cut into sections in various directions; parts were examined uncolored in acetic acid, parts in glycerine after staining in thin neutral solution of carmine.

The method of preparation described presents the advantage that the differentiation between the still uncalcified parts and the remaining calcified bony tissue is brought out distinctly in the sections. I found, in fact, in several spots of the specimen and in different expansions, the bony tissue still uncalcified, as I had already been made to anticipate from the rapid development of the bony masses, and from their surprising softness noticed during the operation.

Further, there was no especial difference in their histological relations between the little bony plates found in the periosteum and the three ridges of bone which projected from roof of the orbit into the cavity filled with air.

Next, as to the bony plates found in the periosteum, they are to be divided, as already referred to in the history of the operation, into the thin, smooth ones, and the thicker kind, with ridges projecting from them into the cavity. The first consist, in their superficial parts most removed from the cavity, of interlaced star-shaped growths of bone tissue, rich in large bone corpuscles; which tissue, up to the superficial parts as well as in the pericellular zone around the large bone cells (1), is calcified regularly or in granular lumps.

The superficial uncalcified parts mentioned run for the most part directly into the fibrous periosteal tissue (as Sharpey's bundles), between which numerous osteoblasts are confined.

Here and there the superficial bone tissue presents a globular appearance. In spaces the thin bony plates are bordered by surfaces in a state of absorption in the lacunæ of which osteoblasts are still lying. At many places I found these absorption surfaces covered entirely or superficially by uncalcified bone strata (see Fig. 5), which are covered over by osteoblasts or contained in a sort of cambium reticulum.

In a few preparations the thin bone plates superficially were found lamellated, and therewith possessed of numerous penetrating vessels. These beds of lamellated bone toward the deeper parts changed directly into reticulate growths of bone structure rich in cells.

At the other places, on the contrary, the thin bone plates passed outward into the stiff fibrous stratum of periosteum by single spurs and tongue-shaped trabecles of lamellated bone. At different depths, mostly slight, under the outer surface of the thin plates, partly in transverse, partly in longitudinal, sections, one encounters everywhere rather narrow vascular canals and spaces filled with marrow rich in cells. These are surrounded partly by cancellated bone, partly by lamellar systems, which are divided from the remaining reticulated substance by cement lines. By this the bone substance is here, also, almost throughout homogeneously calcified in masses covered by dense layers of osteoblasts. I encountered many other vascular and medullary spaces which were in process of lacunar absorption. In one part of the plates the lamellated bone structure preponderated in volume over the non-lamellated, and the lamellæ formed in reality not only closed Haversian systems but had here and there a straight course, sometimes a direction parallel to the surface, and communicated by cement lines with each other,—that is, they are intercalary pieces.

In isolated spots I found inside of these compact lamellated portions of bone, also transverse sections of perforating canals which had come to obliteration through uncalcified bone substance. On the interior surface of the cavity, the plates pass into the enveloping periosteal tissue, partly in form of Sharpey's fibres, partly through more or less wide layers of reticulated bone substance rich in cells.

The structure of the thicker plates presented the peculiarity of containing still larger, deep-seated medullary spaces, which gave the plates a spongy appearance.

These medullary spaces were partly in condition of lacunar absorption; but the surrounding lamellar systems were for the most part intact.

Between these lamellar systems of medullary spaces were

found intercalary pieces, either single and isolated, or united in shape of lattice-work, hollowed out of reticulated bone tissue.

The innermost parts of the plates were demonstrated as of cancellated bony framework extremely rich in cells. This reticulated framework enclosed for the most part straight vascular spaces; many of the latter were, however, also surrounded by unorganized, more or less distinctly lamellated, structures of bone substance, which presented thereby great resemblance to certain forms of bone in the new-born.¹

The lining zones of the above-mentioned medullary spaces, as well as those of the vascular canals in the cancellated framework, were uncalcified, and for the most part covered by thick layers of osteoblasts. (See Fig. 5.)

The construction of the ridges mentioned above as projecting from the plates into the cavity, is essentially that of the thick spongy plates, only here the medullary spaces are confluent in such a manner that their construction is much looser. The reticulated framework of which the ridges are built is formed in only a slight part of cancellated bone substance: for example, in some superficial portions and in isolated intercalary pieces; the remainder is of unorganized and irregularly lamellated tissue, and toward the medullary spaces is surrounded by thin uncalcified zones, which are here and there covered with small spindle-shaped osteoblasts. But in many portions of the ridges the reticulated framework shows lacunar erosion. As contents of the spongy spaces I encountered here a medullary tissue, poor in cells and composed almost entirely of connective-tissue bundles and of blood-vessels. Further, it is also to be mentioned that on quite extensive spots which corresponded to the lateral surfaces, the framework of the same was shown to be covered by thin smooth-bordered bands of connective tissue, which, whilst closing the superficial open medullary spaces, embraced closely the framework and its projecting ends, con-

¹ See v. Ebner on the finer structure of the bone substance. Transactions of the Imperial Academy of Sciences in Vienna, Vol. LXXII, Chap. 3, Year 1875, Plate III, Fig. 20.

taining here also quantities of large, oval osteoblasts in absorption lacunæ.

It now remains still to go into consideration of the construction of the three bony combs which were resected. These correspond in their structure with each other and with the periosteal plates described before, in so far that their framework is built up almost exclusively of a net-work of bone tissue extremely rich in cells. As regards the arrangement and thickness of their framework, some differences are really to be observed, though I regard it unnecessary to go into them further, and cite to Fig. 4, which gives an illustration of the construction of one of the above-mentioned combs.

Now in glancing over the explanation of the microscopic condition for purposes of diagnosis, it demonstrates itself, without going further, that in case of the bone plates and combs examined, we had to do with osteophytic formations, as the macroscopic condition had already with great probability led us to suppose.

The projection and detachment of the examined pieces of bone from the normal surface of the bone, the irregularity of their configuration, and their broadening out near the surface; finally, the manifold non-lamellated¹ but globular and radiating structure, characterize them with all distinctness as to be placed with abnormal, inflammatory, periosteal new-formation of bone substance, therefore of osteophytes.

The fact that one part of the bone pieces examined was more or less lamellated in structure can change nothing in this diagnosis, as always in long-standing osteophytes, and certainly predominantly after advent of local absorption, the appearance of lamellated bone takes place; but besides this, in the narrowing of the vascular spaces in the osteophytic reticulated framework, even without preceding absorption, the bone structure approaches to the lamellar form.²

We have now only to consider the question: Whence, in the described case, came the irritation for the development of

¹ Compare Förster: "Handbook of Special Pathological Anatomy," vol. 2, p. 878. Leipzig, 1863.

² Compare Virchow: "Cellular Pathology," vol. 4, p. 514. Berlin, 1871.

the osteophytes, how it hereby came to development of the pneumatosis, and in what relation the latter stands to ectopia of the globe? That we have not in this case to do with an emphysema of lid or of the orbital tissue is already clear, so much the more so as in the operation the swelling containing air was shown to be covered in front with periosteum.

As to the question of the site of the irritation which caused the growth of the osteophytes, the most correct supposition seems to me to be that of an inflammatory though non-suppurative affection of the frontal sinus, which, in the course of the disease, affected sympathetically the periosteum of the frontal bone and of the roof of the orbit, bringing them into a condition of irritation which gave the impulse for the development of the osteophytes.

The thought that the origin of the disease was in the frontal sinus is very natural. It had forced itself on me already before the operation, as the localization of the pains, and the dull headache which had affected the patient already in the beginning of the trouble, pointed to the frontal sinus, and the appearance of the pneumatosis of necessity strengthened this supposition.

The fact that the pneumatosis first appeared in forced expiration, by sneezing, and could afterward be again produced by increase of air-pressure in the nasal cavities, makes it impossible to doubt that an opening into the frontal sinuses had occurred.

This opening could have been brought about undoubtedly by a primary disease of the outer periosteal covering of the frontal bone, but for the supposition of such primary disease of the outer frontal periosteum there is absolutely no support in the history of the disease. The patient felt in the commencement of the disease no pain—either spontaneous or by pressure—on the border of the orbit. There was never a moment in his memory, when there was any thing which could point to a primary commencement of external frontal periostitis.

On the contrary, it is known that the frontal sinuses, with their communicating nasal cavities, frequently become dis-

eased without external visible cause, even in the course of entirely unnoticed inflammations, catarrh, etc., etc.¹ In addition, it is also favorable to my supposition that, in the course of the operation, as already mentioned, there was no particular frontal sinus discovered, but in its stead only spongy, apparently new-formed, bone.

According to my view, it is more a question of the nature of the accepted primary disease of the frontal cavity, and how, in its course, came about the development of the pneumatosis? To the first question there is not a decided answer, so much only may be accepted with great probability, that it was an inflammatory, though non-suppurative, process, as in course of the operation I encountered neither a neoplasm nor any fluid inflammatory product. It is easy to find an explanation of the development of the pneumatosis also, if we accept that, in the course of an inflammatory, non-suppurative condition of irritation of the investing membrane, the formation of osteophytic growths occurred in the frontal sinus affecting the outer periosteum of the frontal bone.

It is known and easily demonstrable by histological investigation,² that in course of the existence of the osteophytes, not only the osteophytic structure itself, but the shell of old bone underlying it, undergoes absorption.³ A fact for this belief is afforded by the experience which has been collected by authors in the investigation of callus, that old bone under the superimposed callus always becomes thinned by lacunar absorption.⁴

I wish, therefore, to convey the impression that in our

¹ Compare F. Steiner: On the Development of the Frontal Sinus and their Diseases. *Langenbeck's Archiv*, vol. xiii. Berl., 1872. Zuckerkandel: Normal and Pathological Anatomy of the Nasal Cavities and of their Pneumatic Appendages.

² Rud. Maier: "Text-book of General Pathological Anatomy," page 210. Leipzig, 1871.

³ Compare Förster: *loc. cit.*, page 876.

⁴ Compare Volkmann: The Disease of Bone in "Hand-book of General and Special Surgery" of Pitha and Billroth, Erlangen, 1865, vol. ii, part 2, page 373, description to fig. 73. C. Heitzmann: "Compendium of Surgical Pathology and Therapeutics," 3d edit., Vienna, 1871, page 447. Lossen: On Formation of Callus, *Virchow's Archiv.*, 1872, page 48. A. Thierfelder: "Pathological Histology of Bone and Periosteum." 5 vols. post 8vo, 3 of Atlas, Leipzig, 1876, explanation to plate 28, fig. 1.

case by growing out of the osteophytes which clothed within and without the lower wall of the frontal cavity, absorption in one or another or perhaps in many places occurred during the course of the disease, in the old as well as in the newly imposed bone tissue; so that the air passed out of the nasal and frontal cavities through the spongy osteophytic tissue, to appear under the periosteum, where, as already mentioned, it was demonstrable before as well as during the operation.

The further supposition, that the condition of irritation, and with it the process of deposition continued in the osteophytes explains the fact that for a while before the operation the pneumatic swelling could no longer be removed by pressure. The aperture of communication was more or less obstructed in a valve-like way by the bony new-formation.

In conclusion, it remains to discuss briefly what influence the pneumatosis on the one hand and the osteophytes on the other had on the ectopia of the globe.

According to my idea, we have to seek chiefly in the osteophytes the origin both of the exophthalmus and of the downward displacement of the eyeball; for the clinical history shows, that the ectopia of the ball in both directions was already present some time before the pneumatosis appeared. It was only in that period of the disease when the growth of the bony combs was not yet far advanced that a slight increase of the ectopia of the globe was produced by forced expiration.

The pneumatosis never had any influence on the exophthalmus, which was caused exclusively by the osteophytes at the posterior part of the roof of the orbit.

Explanation of the Illustrations on Plates VII and VIII.

Fig. 1. Appearance of eye before the operation, taken on 20th March, 1882.

Fig. 2. View of cavity containing air, as it appeared after dissection of the periosteum, with the three bony combs projecting forward into the cavity.

Fig. 3. Appearance of the eye after healing of the operation wound. Taken 14th June, 1882.

Fig. 4. Longitudinal section through one of the resected combs of bone. A richly-branched reticulated framework, chiefly a net-work of bone tissue, forms the wall of a larger medullary space (covered by portion of the fibrous periosteum), in the point directed downward of one of the bony combs. Toward the surface of resection the reticulated framework is much denser. The trabecles are for the most part calcified. The uncalcified portions are darker in the drawing (in the preparation colored red by carmine). Magnified $\frac{1}{4}$.

Fig. 5. Portion from the vicinity of a medullary space in one of the thicker periosteal plates. Densely placed osteoblasts cover the uncalcified bordering zone of the medullary space. The calcified bone tissue, clearly shown in the picture, contains very numerous, irregular, large bone cells, which are confluent with one another in different ways ; in the vicinity of which the bone substance, in a pericellular zone, is uncalcified. Beyond this are islands of different shapes and free of lime, in which small cells can be distinguished. The portions which are free of lime are represented by a gray shade in the illustration. Magnified $\frac{1}{4}$.

A PECULIAR ANOMALY OF THE OPTIC NERVE.

BY D. O. PURTSCHER, IN KLAGENFURT, AUSTRIA.

(*With drawing, fig. 6, on plate viii.*)

Translated by Dr. J. H. SHORTER, New York.

THROUGH the kindness of Staff-Surgeon Janeschitz and of Regimental-Surgeon Liebl, I had opportunity a few days since of observing a singular anomaly of the transverse section of optic nerve in case of a recruit.

Anton Eggen, twenty years old, of Reichenau in Carinthia, is of very strong physique ; his intelligence, on the contrary, is very slightly developed. He pretends not to see very well in the distance, though he thinks he has never seen any better.

Testing vision gives, in each eye, $\frac{6}{12}$ Snellen without correction by glasses. With weak concave glasses the sight improves to $\frac{8}{12}$ full. The indication for strength of glasses varies somewhat.

Ophthalmoscopic examination shows nothing surprising in right eye. The optic nerve shows a somewhat large but shallow physiological excavation, without sharp edges ; besides this, a weak myopic condition.

The left eye, on the contrary, shows a different condition. (See drawing, fig. 6, plate viii.)

The optic nerve, other than the peculiarity to be spoken of, presents entirely normal relations. There exists a somewhat sharp-bordered physiological excavation lying concentric to the periphery of the optic nerve, whose diameter is about equal in length to the radius of the optic disc.

For an emmetrope with accommodation relaxed, about — 0.75 is required to bring distinctly into view the vessels of the border of the optic nerve, including those of the non-excavated part of the disc as well as those of the adjacent fundus. The bottom of the excavation is only seen distinctly with — 3.0 or — 3.5.

In contrast to this, another part of the transverse section of the optic nerve requires for correction a convex glass, in reality at least a $+ 1.0$.

The large venous branches which join the lower branch of the central vein, in this case two in number, have outside the disc a rather tortuous course. They join together, before entering the depth of the head of optic nerve, into a peculiar plexus, which, as it passes forward over the lower border of the excavation, parallel to the surface of the transverse section of the optic nerve, makes a sharp contrast to the excavation lying below. The lower branch of central vein, resulting from union of the two veins, seems to run directly backward, almost perpendicularly, from the plexus (T-shaped).

But it is not only the point of junction of the two venous branches that separates itself sharply from the background, but the venous trunks themselves contrast sharply with the adjacent parts; for instance, with that part of the disc not comprised within them, toward which, especially in a lateral direction, they present a very decided parallax displacement, which is marked particularly clearly at the lower-outer and lower-inner borders of the optic nerve.

For a clear view of the above-described venous branches, as well as for their plexiform union, at least a $+ 1.0$ is required, whereas the entire border of the optic nerve almost to the ascending venous trunks is clearly seen with $- 0.75$.

The descending branch from the central artery is also first seen sharply with $+ 1.0$. The lower part of the optic nerve—that is, the part confined within the branches of the central vessels which come from below—presents the same condition.

This part of the optic-nerve border shows, besides this, a more than usually clearly pronounced radial striation, which can be followed quite far into the retina. The light hazy reflex of the normal retina about the optic nerve is also especially developed here. Outside of that sector of the fundus comprised within the inferior retinal vessels, the transition from the striated haziness into the neighboring normal retina is quite sudden. Inward from the middle lower branch of the central vein, by tilting the mirror, a striated, very variable reflex from the adjacent retina is especially perceptible.

The anomaly in the optic nerve under consideration consists in the sudden elevation of a sector, and especially of

the vessels of this part, almost $\frac{1}{2}$ mm. above the normal level of the disc. The anomaly of the fundus is so striking that even an unpractised ophthalmoscopist could have immediately noticed it. The image of the lower part of the optic nerve reminds one of choked disc, but any pathological condition can be excluded by its monocular character, and especially by its limited extent, and so much the more readily as all functions of the eye as well as of the individual are entirely normal.

INVESTIGATIONS ON THE INTERCHANGE OF LIQUIDS IN THE EYE, BY MEANS OF SUBCUTANEOUS INJECTIONS OF FLUORESCIN.

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Translated by H. KNAPP.

THE experimental investigations on the currents of liquids in the eye of the rabbit published by Ehrlich¹ are in some points at variance with the results of investigations published by me before.² Ehrlich's experiments consist in subcutaneous injections of fluorescin and observations of the occurrence of the coloring matter in the eye of the living rabbit. These injections have been repeated by Pflüger and others, most extensively by Schöler and Uthoff (Annual Report of Schöler's ophthalmic clinic). The results obtained by these observers, though the experiments were conducted according to the same method and with the same liquids, differ essentially from those obtained by Ehrlich, and in many points also from my own. I thought it incumbent on me to repeat the experiments of Ehrlich, with a view of detecting the cause of these differences. I think the following communication will show that I succeeded in my endeavor.

Some preliminary remarks will not be out of place. Fluorescin is a coloring matter which is brown-red in a concentrated solution; in weak solutions it fluoresces yellow, or, under certain conditions, green. The green fluorescence depends upon the thickness of the stratum of liquid which

¹ *Deutsche med. Wochenschr.*, No. 2, etc., 1882.

² *Graefe's Arch.*, vol. xxvi, No. 3.

contains the fluorescin, and upon the background before which this stratum is situated.

A very simple experiment will account for these differences: Around a plate of red glass wrap white paper from which a round piece is cut out; place it in a glass filled with water, so that only a thin sheet of water is in front of the paper, thus coarsely imitating the conditions of the anterior chamber of a white rabbit. A drop of a solution of fluorescin, let fall on the surface of the water in front of the diaphragm, slowly sinks to the bottom. During its course through the water in front of the paper it is either invisible (if the solution is greatly diluted) or very faintly yellow; when, however, it is in front of the hole in the paper, it shines in beautifully green fluorescence, to disappear again when it descends before the lower part of the paper. The reason of this is very simple. The proper light of the paper outshines the fluorescence of the liquid. The narrower the stratum of liquid in front of the paper, the more this phenomenon is pronounced, which can be easily demonstrated when the paper is held near the wall of the glass (empty anterior chamber).

From this experiment the conclusion can be drawn, even before fluorescin has been injected, that the fluorescence must appear most marked in front of the pupil, because in this place (1) the anterior chamber is deepest, and (2) the proper light of the iris is least disturbing. The disturbance from a light iris is, of course, greater than from a dark one.

The iris itself, even if impregnated with a solution of fluorescin, does not fluoresce in dark rabbits, and only little in white ones, but appears distinctly yellow in the latter, the same as the palpebral edge, the ocular conjunctiva, and the general integument (Ehrlich, Schöler, Uthoff). The reason of this is, that the white iris is not transparent enough to admit of light being reflected from sufficiently thick layer of tissue, whereas in the dark iris even the surface absorbs too much light.

It is strange that neither Ehrlich nor Schöler and Uthoff mention the yellow coloration of the iris. I can explain this only by the supposition that they omitted to experiment on white rabbits.

The yellow coloration being as characteristic of the presence of fluorescin as the fluorescence, it is clear that experiments on white rabbits only can yield trustworthy results.

Ehrlich states that after paracentesis of the cornea in a rabbit injected with fluorescin, the pupillary edge soon shows an intensely shining green coloration, which first spreads over the area of the pupil, and, later, over the entire anterior chamber. He says nothing of the condition of the iris, but jumps at once at the conclusion that the regeneration of the aqueous humor, after paracentesis, proceeds from the ciliary processes through the posterior chamber without participation of the iris. I shall discuss this opinion after I have described the results of my own experiments with subcutaneous injections of fluorescin in albinotic rabbits.

Soon after the paracentesis of the cornea, the pupillary and peripheric parts of the iris, almost simultaneously, show a yellow coloration which rapidly extends over the entire surface of the iris. After this, green fluorescing clouds are seen, principally at the superior margin of the pupil, to descend through the pupil, and disappear at its lower edge. In a short time, however, a green coloration extends from the whole edge of the pupil toward its centre, and a so-called lenticular green fluorescing pupillary exudation forms, which either stays *in loco* or descends with the removed aqueous, like an hypopyon, to the bottom, and at last fills the whole anterior chamber. Under these conditions the pupil, in some cases, appears in the most beautifully green fluorescence, whereas the iris is light yellow.

On the whole, like the other observers, I received the impression that the new aqueous appeared at the edge of the pupil. Was this true, or was I deceived by the greater intensity of the fluorescence in the pupil? Could the aqueous not proceed from the vessels of the pupillary edge of the iris, as I had concluded from my former experiments?

Though I did not find a pupillary exudation extend behind the iris in my former experiments with ferrocyanide

of potassium, I dilated, with atropia, the pupil in cases in which, after the paracentesis, a typical fluorescing pupillary exudation had formed. In these cases the edge of the iris was found partially agglutinated to the anterior capsule of the lens by posterior synechiæ, the pupil dilated only in part, but the free portions of the capsule were devoid of fluorescing exudation, which, consequently, did not extend along the posterior surface of the iris.

Not satisfied with this negative result I returned to my former method with ferrocyanide of potassium, modifying it somewhat. As I have formerly pointed out, it is quite important to interrupt the experiment at the right time. This is best indicated when fluorescin, mixed with equal parts of ferrocyanide of potassium, is injected subcutaneously. If we wish to fix, *i. e.*, to preserve, a given stage of fluorescin coloration in the iris or anterior chamber we have but to kill the animal, quickly to open the anterior chamber, and instil a solution of bichloride of iron in alcohol. The instantaneous formation of Berlin-blue fixes the limit to which the fluorescin has advanced, how long soever the eye may be left in the alcoholic solution of bichloride of iron. The eyes thus prepared were examined both macroscopically and microscopically. Besides the deep-blue lenticular exudation in the pupil some fibrinous flakes were found upon the ciliary processes. From the posterior surface of the iris some thin shreds could be detached which under the microscope proved to be composed of fibrine filaments, but a continuous layer of exudation from the anterior chamber into the posterior could not be detected. The posterior surface of the iris did not adhere to the capsule. It follows that there was no positive evidence of the assertion that the regenerated aqueous passes from the posterior chamber into the anterior around the edge of the pupil, neither was the contrary conclusively proven. In my former paper I expressed the opinion that the regeneration of the aqueous after puncture of the anterior chamber proceeded in general from the dilated vessels of the edge of the pupil, not from the periphery of the anterior chamber as under

normal conditions. Now, like Ehrlich, I consider it probable that the aqueous, after paracentesis, is regenerated from the posterior chamber, though I have been unable to demonstrate it.

What are the phenomena of fluorescence in the intact eye after subcutaneous injections? The coloration is first discernible at the periphery of the iris,—if the experiments are made on white rabbits. Long after this ring-shaped yellow streak we notice the well-known vertical line of Ehrlich, which its discoverer thinks to be produced by a whirlpool-motion. I concur with Ehrlich in the description of this line. It always extends beyond the pupil, but does not quite reach the scleral border. In its upper part I have seen it broaden into a triangle and connected with the ring-shaped coloration of the iris. The explanation of Ehrlich, I think, is incorrect. I must positively assert that this line is nothing but a descending drop, the direction of which in the quiet eye is exclusively determined by gravity. The line is always vertical, howsoever the orbit and the eyeball of the animal may be placed.

The formation of Ehrlich's line is, in my opinion, to be explained as follows :

The ring-shaped peripheric coloration of the iris is produced by the appearance of aqueous secreted on the surface of the iris in that place. As, however, it is so near its outlet, Fontana's space, its greater part at once escapes at the bottom and on the sides of the anterior chamber; at the top only, the escape is retarded by gravity. A drop collects there in the narrow sinus of the chamber, adhering in front to the cornea, behind to the iris, until gravity overcomes the adherence, the drop detaches itself and slowly sinks down—the line of Ehrlich. This also explains why, as Ehrlich first noticed, the line forms a spherical triangle at the top.

By the kindness of Prof. Kundt, director of the Physical Institute at Strasburg, I was enabled to repeat my experiments by spectral light. The ultra-violet rays furnished no result, probably because they are absorbed by the cornea.

Blue spectral light, however, showed the phenomena of fluorescence in the rabbit's eye most beautifully. Several persons have convinced themselves that Ehrlich's line is produced by a drop sinking from the sinus of the anterior chamber down to the bottom. If the animal is placed on its back the line assumes another direction, following in this, as in all other positions, the law of gravitation.

Of many other coloring substances which I have tried, only a so-called azo-pigment, the coccinin, was of some advantage. It has, however, the disadvantage that it must be injected warm, and congeals rapidly.

In conclusion, a few words on the action of eserine. In the myotic eye, the action of fluorescin is more rapid and more intense, and extends more quickly over the whole iris, sometimes so that the colorations from the ciliary and the pupillary edge travel toward each other; but its effect seems also to disappear more quickly.

I have never seen the green fluorescence in the lens of a living animal, but always the normal blue-violet fluorescence.

Without heralding, like Schöler or Uthoff, fluorescin as the long-expected savior of experimental physiology, we must consider it as a very valuable addition to the means of investigation. With gratification I have found that the results of my experiments with fluorescin perfectly tallied with those obtained by means of ferrocyanide of potassium. Ehrlich confirms the two naked facts that the regenerated aqueous humor, after paracentesis, appears at the pupillary edge, whereas, under normal conditions, it appears at the periphery of the sinus of the anterior chamber. If he differs from me in the explanation of some details, I hope that the foregoing lines will pave the way to an agreement of opinion.

NEURASTHENIC ASTHENOPIA AND SO-CALLED ANÆSTHESIA RETINÆ.

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(*Plates iii, iv, and v.*)

ANÆSTHESIA retinæ is not an independent disease, but is the local expression of a general nervous diathesis. Now this general nervous condition presents definite characteristics, and may prove to be the prodromal stage of hysteria and still more serious organic disturbances. In like manner, these local symptoms which we commonly recognize under the name of anæsthesia retinæ, occur in all the developmental phases of these general nervous conditions and severe organic nervous diseases. The name "anæsthesia retinæ" is, however, objectionable, for the reason that, coexisting with the assumed anæsthesia, there is always a hyperæsthetic condition of the nervous visual apparatus, and the results of examination, such as the frequent normal appearance of the fundus, the persistence of phosphenes, and the normal reaction of the pupils, positively exclude the idea of a serious disease of the retina—such as is naturally suggested by the great changes in the visual field. Accordingly, some authors—for instance, Leber—protest against the correctness of the name "anæsthesia retinæ," but still employ it, because its meaning has become established; others—for instance, Mooren—designate the condition sometimes as anæsthesia, sometimes as hyperæsthesia, the choice of name being determined by the relative prominence in each particular case

of increased irritability on the one hand, or decreased functional ability on the other.

This condition is characterized by symptoms related not alone to the optic nerve, but by analogous and equally important ones related to the entire nervous system. These symptoms are partly vicarious and partly affect, simultaneously, different organs of the same individual, quickly changing their locality and sometimes quickly disappearing. Now the pathological basis for the explanation of all these symptoms is one and the same. The symptom which we have been accustomed to regard as generally characteristic of anæsthesia retinæ, is, like the *copiopia hysterica*, so strikingly described by Förster,¹ simply a local manifestation of that nervous diathesis which, according to Beard,² is essentially an impoverishment of nerve-force dependent upon an excessive waste of nerve-tissue. Rudolph Arndt describes this cardinal symptom as consisting in hyperæsthesia, quickly followed by fatigue, making itself specially manifest in severe cases of hysterical tendency by exaggerated reflex activity.

From a purely pathological stand-point, and without reference to the existing etiological conditions, we have here to do with disturbances dependent not upon definite lesions of the nervous system, but, so to speak, upon molecular anomalies not at present understood. Such conditions are generally designated as "functional diseases."

The term "*anæsthesia retinæ*" is objectionable, because there are always present other equally important symptoms relating to the general nervous condition. We would prefer as descriptive of this pathological condition in the eye the name "*neurasthenic asthenopia*," as proposed by Beard, particularly after analysis of the following cases, which show that in almost all neurasthenic patients there exist, in addition to the symptoms of *copiopia hysterica*, all those other symptoms described by Förster³ as characteristic of the visual field in *anæsthesia retinæ*.

¹ *Gräfe-Sämisch*, Bd. vii, p. 88.

² "*Neurasthenia*," by Geo. M. Beard.

³ *Gesichtsfeldmessung bei Anästhesie der Retina, Sitzungsbericht der Heidelberger ophthalm. Vers.*, 1877, p. 162.

The observation of this condition in the eye is of special interest, because we can, from time to time, map out the visual field and test the acuity of vision, thus determining the functional activity of the optic nerve in such a manner that the results can be recorded, and so making available certain objective symptoms while the other symptoms are mostly subjective.

The object of this paper is to show :

1. That in neurasthenic patients, along with copious disturbances, we find all grades of symptoms of so-called anæsthesia of the retina.
2. That these symptoms, on the part of the nervous elements of the eye, are due to the same causes as are the analogous symptoms manifested by the same patient in other parts of the body ; and
3. That it is a mistake to regard anæsthesia retinæ as an independent pathological condition.

For a proper understanding of the condition which we find described as anæsthesia retinæ, we must consider, and properly value, all the symptoms manifested by the patient.

We now proceed to the description of particular cases, and by setting forth all the symptoms, hope to prove that in neurasthenic patients, the so-called retinal anæsthesia is found in all possible degrees of intensity and variability. But first allow me a few words explanatory of the accompanying plates representing the visual field, and of the manner in which the examinations were made.

Förster's perimeter was employed, and a white object, five square millimetres in superficial extent, was moved along the different meridians across the entire field, in the direction indicated by the full-line arrows. The order in which the meridians were examined is shown by the numbers along the outer circle. Observe particularly that the examination was always begun in the horizontal meridian, and was followed out in the order indicated by the figures 1, 2, 3, 4, etc.

In this manner we obtained diagrams of the visual field, taken always under the same uniform conditions ; that is,

the nervous system of the eye had been at rest when the examination was begun in the horizontal meridian, and it became progressively exhausted as the examination was carried on; the fatigue manifesting itself by steadily diminishing the visual field until, in some cases, when the ninth meridian was reached, the nervous power of the eye seemed entirely exhausted. It must be understood that throughout the examination the eye is kept constantly fixed upon the fixation-object—a white ball presenting a disc of about five square millimetres.

After the visual fields are determined, and their boundaries mapped out as shown by the heavy lines in the figures, this peculiarity is to be observed: that at the left extremity of the horizontal meridian—that is, at the place where the examination begins—the visual field is normal in extent, or even wider than normal, or it may be only moderately reduced; but proceeding toward the right, the field both above and below the horizontal meridian contracts in a remarkable manner, and this for the reason that it represents the functional ability of the optical nervous apparatus, which has become fatigued during the examination.

Now allow the patient to rest for fifteen or twenty minutes, and then examine the visual field of the same eye under the same conditions, but with this exception, that the object used in the examination is moved along all the meridians in the opposite direction from that in which it was moved in the previous direction,—that is, in the direction indicated by the dotted-line arrows. In this way we obtain for each eye two visual fields, the boundaries of which intersect each other in the vertical meridian. The second field, indicated by the dotted lines, we will, for the sake of convenience, call the “counter-field.” Observe now that the most contracted part of the counter-field, representing the functional activity of the fatigued retina, lies on the same side as the most expanded part of the visual field, and wholly within its boundaries.

The exterior boundary lines, the full lines in the left half, and the dotted lines in the right half, regarded as one

figure, represent the visual field of the rested or only slightly tired eye, while the inner lines, likewise combined to one figure, represent the visual field of the same individual at a time when the nervous part of his eye is nearly exhausted.

CASE 1.—Fig. 1. Mrs. R.; delicate figure, thirty-four years old, married twelve years, menstruates regularly. Was formerly healthy. Some years ago passed through a severe attack of articular rheumatism. Two years later she had diphtheritis and abortion, followed by a return of the rheumatism. She dates her present troubles from that time. Complains of migraine now on the right and now on the left side; of terrible pain in the crown of her head and great tenderness of the scalp. Is very forgetful. Loses herself often in the midst of a sentence, and cannot proceed to express herself. Suffers from palpitation and anxiety. Spirits very changeful, generally depressed; is very moody, and weeps much. At times passes into an hypnotic condition, during which she stares into the corner vacantly and knows nothing. Has hallucinations; thinks she hears her name called, or children crying, or bells ringing. Often hears a roaring in her ears. Is much annoyed by noise and long conversation. Often experiences a bad smell, and has a continual bad taste in her mouth. Her tongue is clean. Has aversion to meat.

Has deep-seated pain in both eyes. Is dazzled greatly by light, especially by lamplight. Has a severe burning sensation in both eyes. Often sees before her eyes countless black specks, which disappear when she turns her head. It often seems to her as if there was a mist or smoke in the room. This symptom appears and disappears suddenly. When she tries to read or sew, the letters or work become confused, and finally disappear. Has often temporary diplopia. Suffers from intercostal neuralgia, and often has a pricking and itching sensation in the face. Often has numbness of the fingers and cramps in her arms and legs. Her legs go to sleep easily, and she often experiences the sensation of formication. Always feels tired, and complains of pain in the back. Cannot sleep at night, but tosses restlessly in bed. Often has the feeling as if her throat and bowels were choked up. Has much gurgling in the intestines and much thirst. At times passes a great deal of urine, and at other times very little. Examination of the viscera gave no particular clue to diagnosis. Examination

of the eyes showed in both hypermetropia $\frac{1}{16}$, normal acuity of vision and accommodation. Pupils normal in size and reaction. Fundus normal. In both eyes slight hyperæmia of the conjunctiva.

In this case the visual field of the right eye only was taken. During my attempt to take that of the other eye, the woman became so exhausted that I was obliged to desist.

The heavy full lines in this, as in all the following figures, show the visual field as obtained at the first trial. The heavy dotted lines show the counter-field taken by the method already described, after a rest of about fifteen or twenty minutes. The light dotted lines show the boundary of the normal visual field.

CASE 2.—Fig. 2. Mrs. B., a slightly-built woman, thirty-one years of age. Experienced lead-poisoning when a girl; is always very tired and heavy in her legs, and suffers from dyspnœa on slight exertion. Formerly menstruated very irregularly; now menstruates regularly every three weeks, but for only a single day at each time. Blood flows from her mouth at night, but she does not know whether it is coughed up or vomited. She was married when twenty-three years old, and has four children. Inherits a neuropathic constitution. Her mind is very weak. Has palpitation and anxiety. Has terrible dreams. Formerly could not sleep well, but is now better in that respect. Complains often of dizziness. Is greatly affected by trifles, and of a very changeable disposition. Complains of occasional pains in her forehead, and of pressure in her head. The senses of taste and smell are normal, but she complains much of a roaring in her ears, and at times has hallucinations of hearing (hears children crying). Has an annoying sense of pressure in both eyeballs. Sees well, but after gazing steadily for a while at one place, every thing grows gray before her. A short time ago she had a hallucination of sight, thinking she saw a black coffin standing in the room. Often has photopsiæ in the form of small birds flying before her eyes. She is not dazzled by light, but she cannot use her eyes for any continuous work. Sometimes sees double, and suffers often from blepharospasm. Occasionally feels a numbness in her legs and hands. Sometimes has attacks of cramp, with trembling of

the limbs, groaning, and a semi-unconscious condition. Fugitive pains in shoulders and arms. At times pain in left ovary. Has pains in her loins and along the whole spinal column. Has a feeling as if her legs were broken below the knees. Has much pain in the abdomen,—colic and bloating. Her feet are always cold. She becomes often hot and then cold in her body. Drinks and urinates much. Has a variable appetite, at times ravenous, and again no desire for food.

She has in both eyes slight hypermetropia, normal accommodation, and acuity of vision. The pupils are remarkably large, but show prompt reaction. The appearances observed on ophthalmoscopic examination are normal. There is slight insufficiency of the internal recti muscles. During the attempt to map out the visual field, the test-object often disappeared in its passage along a meridian, while the fixation-object appears now large and now small, now nearer and now farther; often it entirely disappears. These anomalies are observed in both eyes.

CASE 3.—Fig. 3. Miss Th., seventeen years old. Family history good; has not yet menstruated. A weak, anæmic girl. For past seven years has suffered from chorea, and is said to have formerly had nystagmus. Mind weak, disposition variable, cries easily, is troubled by trifles, is anxious and fearful. Evenings she is much excited and cannot sleep. Complains of frontal headache, and of a beating in her temples. Always has cold hands and feet. Changes color easily. Complains much of pain in her stomach and of loud belching. Has little thirst and very variable appetite. Has various idiosyncrasies. Is liable to drop objects out of her hands, and has a feeling as if her legs were broken. Her whole body trembles with chorea. When reading or sewing, "all seems to run together." She often sees every thing as through a gray veil. This condition lasts generally for about ten or fifteen minutes and then suddenly passes away. She sometimes sees double. No anomalies of the muscles of the eye are to be observed. The pupils are wide, but are alike and react promptly.

Vision is not quite normal, and varies between $\frac{3}{8}$ and $\frac{1}{2}$. She has slight hypermetropia. While mapping the visual field the test-object often disappears in the neighborhood of the fixation-object, which latter also sometimes disappears, leaving for certain meridians a central scotoma. The color-sense is normal. The visual field of the right eye shows the same anomalies as that of the left.

CASE 4.—Fig. 4. Miss P., apparently a strong woman, æt. twenty-three, two years betrothed. Was often sick when a child. When seven years old had scarlet-fever, and corneal ulcer on left eye which resulted in leucoma adherens. Menstruated at age of seventeen, at first irregular, and afterward regularly. For past year she has complained of the following troubles. Without any apparent cause she often experiences great depression of spirits and shows great variations of temper. Has headache nearly every day, and a feeling of pressure on the crown and of knocking and hammering in her temples. In spite of her robust appearance she has a great deal of backache, can endure no continuous labor, and feels as if her legs would break. Often has palpitation, and is out of breath when she goes up-stairs. At times feels pressure and pain in the stomach. Once coughed up blood. Is always cold. Left ovary very painful under pressure. She cannot sleep when she goes to bed, and wakes in the morning with a sense of exhaustion. Has terrible dreams, and often cries out in her sleep. Her sense of taste is often wanting. She is so dazzled by light that she often has to sit during an entire evening in a dark room. There are often times when every thing appears to her as if seen through mist or smoke. These attacks after lasting about half an hour pass away suddenly. She has normal acuity of vision in the right eye; in left eye leucoma adherens. Pupils large and thin, reaction normal. Ophthalmoscopic appearances normal. The visual field of the left eye could not be taken on account of the presence of the leucoma.

CASE 5.—Fig. 5. Miss H., æt. twenty-two; strongly built. Has passed through much mental distress, her family having lost property, and she being compelled to work for a living. Is betrothed, but worries herself and her lover by her jealousy. Menstruates irregularly; much inclined to weep. Of a very variable disposition and irritable. Complains much of palpitation and sleeplessness. Her sleep is interrupted by frightful dreams. Has a boring pain in her crown and a beating in her temples. Globus hystericus. Has once vomited blood. Complains much of pain in her abdomen. Tires very easily of work, feels as if bruised in the limbs, and often has cramps in her hands and legs. Feels alternately cold and hot, and always has cold feet. She often has the feeling as if her eyes were forcibly turned, and is very much dazzled by lamplight. Often has shadows before her eyes, and a sensation as if the room was full of smoke. Has often had tem-

porary diplopia. Upon examination the ocular muscles appear normal. Has slight hypermetropia, and normal vision and accommodation. During the examination with the perimeter central scotoma often appeared, and the test-object would momentarily disappear while passing along a given meridian.

CASE 6.—Fig. 6. Miss Von H., strong frame, æt. twenty-six. Had severe typhoid fever when nine years old. Has menstruated regularly since fifteen years old. Her present troubles have existed for four or five years. They are said to have been caused by a terrible fright, caused by a hallucination of sight which she experienced. Since then her mind has been confused and she has been unable to control her thoughts. Mental exercise is very difficult for her. She complains often of migraine and of a boring pain in the left side of her head. Temper very variable. Easily irritated, and often filled with anxious forebodings. Complains of a feeling of throbbing in the temples, and of occipital neuralgia. Often has hallucinations of sight, sees animals and landscapes, and has a constant humming and roaring in her ears. Often imagines that she hears the ringing of bells. Varies between great and very little thirst. Her appetite also is variable, but she has a constant disgust for meat. Complains of dyspnœa upon going up-stairs, of palpitation, and of abdominal pains. Vision, size and reaction of the pupils, and color-sense all normal. Slight hypermetropia and insufficiency of the internal recti muscles. Ophthalmoscopic appearances normal. The visual field of the right eye shows analogous peculiarities.

CASE 7.—Fig. 7. Mrs. N., forty-seven years old, married at twenty-nine. Had typhoid fever at eighteen, but recovered and felt perfectly well and sound. At birth of her first child she suffered a great rupture of the perineum, which was followed by prolapsus uteri. Her troubles date from that time. Her menses ceased one year ago. At the times when they should appear all her bad symptoms increase, and she feels very dizzy. She feels weak and tired; sleeps well; often depressed in spirits; easily irritated; has become very forgetful, and easily becomes dizzy; often has headache, beating in the temples, and humming in her ears. Sometimes loses her sense of taste. Complains much of pain in the back, mostly when lying down. Has also shooting pains in her shoulders. Right leg weaker than the left, and she often has a feeling of numbness in it.

Appetite poor; little thirst. Often sees every thing as if through

a blue veil, and this condition will often pass away suddenly as if by a stroke. Is much dazzled by lamplight, and when at evening the lighted lamp is set upon the table she experiences severe pain in the head and a hammering in her temples. Her troubles increase when she tries to read. The letters seem to change their size, sometimes seeming large and sometimes small, and then disappearing entirely. When looking intently at any one with whom she is speaking, his features will disappear, to her great annoyance. Has never had diplopia.

Myopia— $\frac{1}{2}$ in both eyes. Vision, $\frac{2}{8}$. Ophthalmoscopically, an atrophic ring can be seen surrounding the optic disc. The pupils are equal in size and of normal reaction. After a colporrhaphia posterior all her bad symptoms, both general and special, as affecting her eyes, disappeared.

CASE 8.—Fig. 8. Miss I., sixty years old, inherits neurotic troubles. Her mother was an epileptic. As a child she was always chlorotic. Menstruated at fifteen, always irregularly. Her menses ceased six years ago, since which time her nervous troubles have increased. Was formerly very forgetful and abstracted and now finds it very difficult to collect her thoughts. Much inclined to weep; very irritable and generally depressed in spirits. Rests poorly, not being able to sleep until near morning, and when in bed she feels such an itching and burning of the skin that she cannot lie quiet. Upon waking she feels tired, and as if she had been pounded. Complains much of pressure on her head, and of occipital neuralgia. As a girl, she often had hallucinations of sight, saw faces and marching soldiers, and clouds often seemed to float before her eyes. When she tries to read or sew, every thing swims before her eyes, and she experiences a straining of the eyes which is only slightly relieved by convex glasses. Light dazzles her much, and the reflex from her spectacles annoys her. Color-sense is normal. There is slight insufficiency of the internal recti muscles. She imagines often that she hears her name called, and has an almost constant ringing in her ears. Objects which have really not changed for the worse often seem to her to have a sickening smell. She often loses the sense of taste. Easily becomes hoarse. Is often unable to express herself; words failing her. Complains much of palpitation and anxiety. Formerly had much pain in her abdomen, twitching of the arms, and burning of the skin. Suffers from intercostal neuralgia, and the feeling of heaviness and breaking in her legs. Often has trembling of the extrem-

ities. Much backache, thirst, and variability of the appetite. Obligated to urinate fully. Her feet often swell. Frequent change of color, and change of feeling from warm to cold. Pain in the inguinal region. Numbness in fingers and legs and formication. Slight hypermetropia and presbyopia. Vision = $\frac{4}{8}$. Ophthalmoscopic appearance normal. The visual field of the right eye was not taken.

CASE 9.—Fig. 9. Minna J., seventeen years old; thick-set; healthy appearance. Menstruated once in her sixteenth year, but never since that time. Until a short time ago was entirely healthy, but complains now of palpitation and anxiety, particularly at night, so that she often starts up affrighted in bed. Cannot sleep well. Feels tired when she rises in the morning. Has frightful dreams. Is irritable and depressed in spirits. Often imagines that she hears her name called. Is very much disturbed by noise, and cannot endure loud conversation. At times hears poorly with her left ear. Has often a bitter taste in her mouth. Often feels as if a dark veil was hung before her eyes, which condition will last for about a quarter of an hour. After she has read a little while the letters swim before her eyes. Often has hallucinations of sight; thinks she sees large animals and men. Has moderate hypermetropia, and vision $\frac{4}{8}$. At a time when her general health was better, her vision was found to be $\frac{4}{8}$. Pupils large, but of prompt reaction. Ophthalmoscopic appearances and color-sense normal. A short time ago, complained of monocular diplopia. When she strains her eyes they weep as if she had been crying. Complains much of a beating in her temples and of headache. Often has spasmodic twitching of the eyelids and of the lips. Intercostal neuralgia on right side. Left ovary very tender under pressure. Backache; pulsation in abdomen. Complains much of fatigue. Her feet and hands easily become numb. Her legs go to sleep, and her right arm is often powerless. She often has clonic cramp in her left arm and hand. At times has pain in the abdomen, shooting from the back to the inguinal fold. Patellar reflex exaggerated, so that upon striking upon it the twitchings extend over the whole body. Changeable appetite. The visual field of the right eye shows analogous relations.

CASE 10.—Fig. 10. Anna B., fourteen years old, menstruated a short time ago. A scrofulous girl, with episcleritis. For last few weeks has complained of a pricking in her eyes, and weeping when she uses them. At first she can read well, but after she has read

a few lines the letters seem to swim and disappear. After turning from the book and resting her eyes she is again able to read a few lines. Her vision changes greatly. Some days she can see much better than others. Often, for hours, every thing seems as if seen through a gray veil. She is much dazzled by lamplight. Often has temporary diplopia without there being any observable anomalies on the part of the ocular muscles. Ophthalmoscopic appearances normal. Pupils of equal size and have normal reaction. She has hypermetropia, $\frac{1}{2}$; but in spite of convex glasses all her troubles continue. At the time of examination her vision was normal. She has attacks of blepharospasm. Has almost continual headache, and at times palpitation of the heart, and a feeling of anxiety. She is very peevish and inclined to cry. The visual field of the left eye was not taken.

CASE 11.—Fig. 11. Mr. G., upholsterer; an anxious, haggard-looking man. Complains of mental weakness, inability to remember names, disinclination to work or to engage in any of the employments which formerly interested him. Broods much over his condition, has inherited a neuropathic disposition, is easily irritated, and can endure no contradiction. Is generally depressed, but sometimes excited, at times without any adequate cause. He has no interest in his business, but is inclined to dream of better times. Complains of involuntary emissions and of the annoyance he feels that this infirmity is manifested to others by the appearance of his countenance. He feels tired and sleepy in the morning and complains much of backache. His arms and legs are often lame. Has a numbness in the hollow of his soles. Feels weak in his calves. Has a dull expression of the eyes. After having had an emission at night his eyelids feel as heavy as lead in the morning. Feels better generally in the evenings. Complains of a pricking, burning feeling in the eyes, of pain and a confused feeling in his head. Appetite changeful. Very little thirst. Has read much in medical books, and imagines all kinds of absurdities in reference to his condition.

Has in both eyes hypermetropia of $\frac{1}{2}$. Normal vision. Ophthalmoscopic examination reveals hyperæmia of the optic disc. Slight insufficiency of the internal recti muscles and slight conjunctival catarrh. Cannot wear the glasses which correct his hypermetropia. He sees better through them, but the reflex from the glasses dazzles him, and he cannot endure the slight pressure which they cause upon his nose and temples. The visual field of the right eye shows analogous relations.

CASE 12.—Fig. 12. Mr. P., twenty-four years old, merchant; of weak, anæmic appearance; inherits a neuropathic constitution. His father was born with hydrocephalus, was operated on by puncture; later became insane and died of apoplexy. His mother is said to have been very nervous. The patient shows much intelligence, and at times can carry on his business with great ability, but he often becomes so exhausted that he must lie still for hours, and at such times it is impossible for him to collect his thoughts. Has a very variable disposition; is generally depressed, but sometimes excited. Has times of abstraction when he hears nothing that is said to him although he sees that some one is speaking to him. Experiences various hallucinations. A short time ago he ran along an alley believing that he was followed. Has roaring in his ears, hears his name called, sees shadows and small gliding animals and persons, which appear to him in his office. Is much dazzled by light, and sees a red cloud of light when his eyes are closed. His pupils are of different size and react promptly. Ophthalmoscopic appearances and color-sense normal. Vision normal with slight hypermetropia. There is slight insufficiency of the interni muscles. Slight conjunctival catarrh and painful burning feeling in the conjunctiva. This condition and the red cloud which he sees when his eyes are closed often give him the sensation as if his eyes were on fire. Amaurosis partialis fugax has recently appeared. He has also hallucinations of taste and smell and a number of other abnormal symptoms. The use of wine diminishes all these bad symptoms. The examination with the perimeter revealed the following conditions: torpidity of the retina; blepharospasmus clonicus, followed by cramps of the muscles of the face, and finally by general spasms. The visual field of the right eye shows analogous relations.

CASE 13.—Fig. 13. Miss S., governess, eighteen years old, of blooming appearance. Said to have been a weak child. Menstruated since her thirteenth year, at first regularly. Had diphtheritis two years ago, and since then has menstruated irregularly and been very nervous. Since that time she has noticed at the time of her menses a peculiar clouding of the eyes and inability to see well. For some months past her sight in general has not been so good as formerly, and it is only in a very bright light that she can see distinctly. She cannot, however, endure bright lamplight, and has to sit evenings in

a dark room. When she passes from darkness into the light she is attacked with dizziness. Her temper is very variable, and she cries easily. She often has attacks of migraine, palpitation of the heart, anxiety; and shortness of breath upon going up-stairs. She has much pain in her abdomen and a feeling of constriction about her waist. Has frequent twitching of the under lid. Taste and smell normal. Feels always tired. Sleeps poorly and complains of backache. The pupils are very wide, but react promptly to light. There is hypermetropia, $\frac{1}{16}$; normal vision, but the degree of vision is subject to frequent changes. The visual field of the left eye shows analogous relations and limitations.

CASE 14.—Fig. 14. Mrs. S., twenty-four years old. Has very poor vision, about $\frac{1}{16}$. Pupils alike and react promptly. She recognizes all colors except red, which she says looks brown. Light pains and dazzles her. Has slight blepharospasmus clonicus. The ophthalmoscope reveals atrophy of the pigment layer throughout the entire fundus and a moderate degree of hypermetropia. Her vision varies with the state of her health. Her sight failed gradually. Objects often seem to her as if seen through a cloud. During her pregnancies this capricious patient has always been very hysterical. The right visual field is still more contracted than the left. In spite of her contracted visual fields and poor vision her manner and movements give no hint of the existence of such a high degree of amblyopia.

CASE 15.—Fig. 15. Miss C., twenty-three years old, companion of a lady who is an epileptic and insane. She once had a hemorrhage from the mouth, but whether she vomited or coughed the blood up is uncertain. In the winter of 1880–81 she had for a few days a continuous frontal headache, palpitation of the heart, hyperæsthesia of the scalp, and clavus hystericus. Slept well. In the beginning of December (probably in 1881) she had frequent attacks of headache with free intervals, loss of appetite, and irritable temper. Became very sensitive to smells. Latterly the headache has increased and her vision has become at times clouded; she feels tired, and she suffers from alternate chills and heat. Her vision began to fail markedly three weeks ago. Jan. 10, 1882, she began to feel sick in the mornings when she got up; had a burning sensation in her eyes. In the evenings she was accustomed to play at cards. She noticed that every thing looked cloudy to her, and her visual field became so contracted that it seemed as if she saw every thing through

a horizontal slit. For some time objects have looked to her as if seen through a gray-blue veil. Greatly to her annoyance she has been wearing convex glasses which had been prescribed by a physician on account of her slight hypermetropia, but all her troubles have increased. With slight hypermetropia her vision varies from $\frac{2}{8}$ to $\frac{3}{8}$. Color-sense, ophthalmoscopic appearances, and behavior of pupils normal. Upon one occasion during examination with the perimeter vision, in consequence of fatigue, sank to $\frac{4}{8}$. The visual field of the left eye is less contracted.

CASE 16.—Fig. 16. Miss B., a delicate young lady who has always been sick. Cannot get to sleep till near morning. Complains of great variation in her spirits; is generally irritable and peevish; subject to palpitation, throbbing in the temples, dyspnoea, backache, pains in her legs and head; always tired; wakes in the morning feeling quite worn out. Menstruation irregular. She often experiences great anxiety, and her color changes frequently from red to white. She is so blinded by light that during the evening she cannot sit in the family room. She cannot endure loud conversation nor the noise of passing wagons. Has myopia of $\frac{1}{4}$ to $\frac{1}{2}$, with vision $\frac{3}{8}$. Ophthalmoscopic appearances normal. Pupils very large, but alike and of prompt reaction. Slight insufficiency of the interni. Cannot wear spectacles to correct her myopia because she is so annoyed by the reflex from the glasses, and because the cutting of the frame upon her nose and temples causes an unendurable pain. The visual field of the right eye shows analogous though less pronounced relations.

CASE 17.—Fig. 17. Mrs. V., a strong and voluptuous-looking woman. Of neuropathic heredity, and during her youth affected with scrofulous disease of the bones. To the time of puberty was a somnambulist. Suffers from uterine disease. Complains that she is constantly in a kind of dreamy condition; cannot retain her thoughts; often loses herself in the midst of a sentence. Of an irritable and peevish temperament. The number of her complaints and symptoms is enormous, indicating a decided case of hysteria. Complains of poor vision and inability to read or sew. Has astigmatism. Vision, $\frac{2}{8}$. After examination with the perimeter, her vision sank to $\frac{4}{8}$. Sees much better through proper spectacles, but cannot wear them because the reflex and the pressure of the frames annoy her so.

CASE 18.—Fig. 18. Mr. D., has indulged in great sexual ex-

cesses. Is thirty-four years old, and still practises masturbation. Is weakminded, has an uncertain, halting gait, a twitching of the eyeballs, difficult speech, palpitation, and fearful anxiety. Slight myopia. Insufficiency of interni. Vision $\frac{3}{8}$. Pupils normal. The contour of the retinal vessels is remarkably clear and broad. Has headache, abnormal sensations of smell; is very irritable and depressed, and has innumerable nervous symptoms. Is much dazzled by light.

CASE 19.—Fig. 19. Miss K., fifteen years old, appears strong and rosy. Has poor, brittle teeth. A year ago had a fall upon back of head, which caused long-continued unconsciousness. Since then all manner of troubles. Often complains of headache after mental exertion. Has at such times the feeling as if a plate lay upon her head. At various times has had transitory diplopia. Complains of pain in eyes. Occasionally has macropsia and micropsia when reading. Objects often appear nearer or farther away than they really are. Has hallucinations of hearing. Hears her name called. These imagined sounds are very loud, and appear to come generally from behind her and to reproach her. It often seems as if a veil were hung before her eyes, and then this appearance vanishes suddenly. Sometimes she sees much worse than at others. Formerly was troubled by photopsies in form of showers of sparks. There are often times when she can see only the particular object upon which her eyes are fixed, while all the peripheral visual field seems obscured by a cloud. There is hyperæsthesia of taste and smell. Often her hearing becomes poor, and at other times it becomes abnormally acute. At times, too, she has good vision. Often every thing tastes badly to her. At times she has slight temporary ptosis. Pupils often unlike in size, but react normally to light. Although a very intelligent girl, it is at times impossible for her to collect her thoughts. Has palpitation, anxiety, restlessness, and variable temper. Has a feeling of dryness in the throat, and of pulsations in the abdomen. Is tired, and has a feeling of numbness in her arms and legs. Sleeps poorly. Has slight myopia and normal acuity of vision. For some weeks has had attacks of amaurosis partialis fugax of about ten minutes' duration. Associated with these attacks is complete left-side hemianopsia, with zigzag flickerings of light on the margin of the visual field. The left halves of the visual fields are obscured during these attacks, and there occurs at the same time a weakness and a disturbance of

sensibility of the entire left half of the body. This condition ends in a severe headache. There is quite marked hyperæmia of the optic disc. Slight insufficiency of the interni. The portion of both visual fields which is cross-hatched in each figure shows the existence of an annular scotoma. It can be seen that during the second examination of the same eye an annular scotoma appeared upon the other half of the visual field, occupying a part of the region of the first one. The scotoma with its concavity turned to the right, indicated by black cross-hatchings, belongs to the first-taken visual field, which is indicated by the full black lines; the one with its concavity turned toward the left, indicated by broken line cross-hatching, belongs to the visual field indicated by the broken lines. The visual field of the left eye shows analogous changes, including the annular scotoma.

CASE 20.—Fig. 20. Anna T., a strong woman, thirty years old. Menstruated at seventeen years. Her periods were always regular, but were accompanied by considerable pain. Vision has been poor since childhood. Often has hallucinations of sight; often sees heads and deformed faces. Has distressing dreams; cries easily; has a changeful disposition, but is generally depressed, as is indicated by her countenance. When she tries to read or sew every thing swims before her eyes and disappears. Often feels as if the room were filled with smoke; is dazed by light; has had nystagmus since youth. Suffers much from headache; her sense of smell sometimes entirely fails; has a continual throbbing in her temples; much backache and frequent lameness of her legs; her feet swell easily; has palpitation; loses breath in going up-stairs; easily becomes cold.

Ophthalmoscopic appearances normal; no anomaly of refraction. Vision in both eyes $\frac{1}{8}$. Pupils normal. The visual field of the left eye was not examined.

CASE 21.—Fig. 21. Mrs. P., thirty-two years old; of strong, blooming appearance. Faints very easily; much depressed in spirits; sleeps poorly; always tired; has palpitation and anxiety; pain in side; occipital neuralgia; throbbing in temples; numbness in right leg and hand; her extremities often powerless. Since last confinement has had prolapsus uteri; has a slight degree of hypermetropia, with vision $\frac{1}{8}$. Has hyperæmia of optic disc; hallucinations of sight; is much dazzled by light, and has slight insufficiency of the interni. Pupils normal. Complains of roaring in her ears; is forgetful and absent-minded; has hyper-

æsthetic condition of taste and smell. The visual field of the left eye was not examined.

CASE 22.—Fig. 22. Miss B. T., twenty-three years old ; was healthy until after appearance of menses in her seventeenth year. They came on at first every fortnight, and lasted for eight days. Then they did not appear for a whole year. She is now irregular ; before the appearance of her sickness she has feelings as if she were enveloped by a cloud, and has hallucinations of sight. She is now much dazzled by light ; becomes dizzy and has headache as soon as she is dazzled. She often suffers from amaurosis partialis fugax, with defect of the left half of the visual field, with subsequent migraine and vomiting. Often has temporary diplopia. Cannot work continuously, as the object looked at often disappears from her sight. She sees stars and balls, which seem to elongate before her eyes. She sheds tears without any mental disturbance ; complains of burning in her eyes. Conjunctivæ often hyperæmic ; sometimes has ptosis. Often thinks she sees objects and figures whisk by her. Has hypermetropia, $\frac{1}{2}$, in both eyes ; normal vision and accommodation, blepharospasmus clonicus, macropsia, and micropsia. Sight of bright colors causes headache. Cannot sleep when she retires ; wakes in the morning feeling as if she had been beaten. Has most of the symptoms described in the previous cases. The visual field of the right eye shows analogous relations.

CASE 23.—Henrietta P., thirteen years old ; not yet menstruated. Complains that she has lately had great trouble with her eyes when she tries to read or sew ; is much dazzled by light, and has a pricking in her eyes. Has frequent hallucinations of sight, —sometimes diplopia, macropsia, and micropsia. When she reads the letters all run together. Reaction of pupils normal, but the right one is larger than the left. Color-sense normal. Has hypermetropia ; normal acuity of vision. Slight insufficiency of interni. There is slight capillary hyperæmia of the optic disc. Has backache, pain and pressure in the head ; variation in acuteness of hearing, and hallucinations of hearing. Voices seem to come from behind her. Often loses sense of smell ; has anxiety ; sleeps well. Has frequent pain in abdomen and under her knees. The visual field resembles that of the foregoing case—Fig. 22. The contraction of the field still remained after three weeks of electrical and dietetic treatment, during which all her other symptoms improved.

CASE 24.—Miss D. F., thirty-four years old ; healthy appearance. Complains of left-side migraine and floating specks in her eyes, followed by vomiting. Has hallucinations of sight, macropsia, and micropsia. Is much dazzled by light ; has a feeling as if her eyeball were turned around in its socket. Sometimes has tears in her eyes ; frequent attacks of cloudy vision, but no photopsies. Cannot work continuously, and often sees double. Pupils unlike, but react promptly to light. Ophthalmoscopic appearances normal. Complains of pressure on the skull and inability to think. Often stops speaking in midst of a sentence because she has forgotten what she wished to say, although naturally talkative. Sleeps poorly. Is often in high spirits, and then again depressed,—almost to the verge of suicide. Has hallucinations, and exaggerated acuity of hearing. At times every thing smells and tastes bad to her. Is often anxious ; has palpitation, and sometimes red patches on her face. Complains of a constriction in the throat ; suffers from hypnotism and apathy. Is alternately hot and cold. Upon going to bed she experiences such a pricking in her skin that she has to spring up. Wakes exhausted in the morning ; has backache and intercostal neuralgia. Was once formerly treated for an hysterical neurosis of the hip-joint ; complains now of pain in the joints of her hands and knees. The visual field is like that in Fig. 9.

If it is true, as Rudolf Arndt asserts (*l. c.*), that the sum of all the morbid symptoms in neurasthenia can be subordinated into the one fundamental phenomenon, of an increased excitability of the nervous system, with a tendency to rapid fatigue, particularly of the muscular spheres, followed possibly by convulsions in the muscles and corresponding processes in the glands (transition toward hysteria and epilepsy), then we can easily explain the clinical symptoms of the so-called hyperæsthesia, or anæsthesia, of the retina.¹ For

¹ I will venture to report, in brief, the ocular symptoms of some cases that I have seen since beginning this paper.

(a) Mrs. A., æt. thirty ; has lost children from convulsions. Is dazzled by light, has attacks of misty vision, slight amblyopia, periodical left-sided hemianopsia with flickering photopsies, and a diminution of sensibility on the entire left side. Hallucinations of vision ; sees cats, and has other typical nervous symptoms. Ophthalmoscopic condition normal, pupils normal, visual field resembles that shown in Fig. 5.

(b) Child, æt. twelve ; dazzled by light, *Hm.* and slight amblyopia. Pressure in the eyes, and cannot work very long. Ophthalmoscopic condition normal ; constitutional nervous symptoms.

under this symptom, which might more appropriately be called neurasthenic asthenopia, we understand the local appearance of a constitutional nervous affection, the expression of which in the eye is introduced in the form of increased sensibility, and greater irritability of the entire optical nervous apparatus. Amongst the symptoms which cause the greatest annoyance to the patient are the appearance of hallucinations of vision, visual illusions, photopsies, dazzling of the eyes from any bright light, and, on the part of the trigeminus, pricking, boring, and burning pains, together with a feeling of pressure and sensations of rotation in the eyes and their neighborhood. As a result of this hyperæsthetic condition, we immediately discover a greater tendency to weariness, or even conditions of partial paresis, which on the part of the nerves of special sense express themselves objectively in that peculiar form of contraction of the field of vision, or by transitory diminution in the acuteness of central vision, by the appearance of evanescent central and ring scotomata, marked also by too rapid disappearance of any given fixed objects, by obscurations of vision and lack of ability to read or to use the eyes at close work for any length of time; and, finally, distinguished, on the part of the accommodation and the extrinsic muscles of the eye, by micropsia, insufficiency of the internal recti, diplopia, and ptosis. These symptoms, moreover, are frequently accompanied with secretory and vaso-motor disturbances, inasmuch as without any particular external influence such patients as these occasionally complain of tears, transitory injection of the conjunctiva and ciliary vessels, while with the ophthalmoscope we can generally discover a hyperæmic condition of the optic papilla.

(c) Mrs. B., æt. thirty-one; slight amblyopia, dazzled by light, hallucinations of vision, photopsies, insufficiency of the int. recti, numerous nervous symptoms, disease of the uterus. Normal ophthalmoscopic condition. Visual field as in Fig. 10.

(d) Miss C., one of the *demi-monde*, æt. twenty-six; dazzling hallucinations of vision, sees vanishing shadows, photopsies, macropsia and micropsia, sudden obscurations of the eyes, pain in the eyes, lachrymation, numerous nervous symptoms, disease of the uterus. Visual field as in Fig. 5; astig. myopic: S = 1. Ophthalmoscopic condition normal, pupils normal.

(e) Miss F., æt. twenty-three; amblyopia, hallucinations of vision, misty vision, photopsies, typical nervous symptoms, uterine disease, hyperæmia of the optic papilla. F. as in Fig. 4.

We occasionally also observe an increased, morbid reflex action toward the sensitive and motor spheres, expressing itself by violent headache whenever the light is more dazzling than usual, by an increased burning sensation and lachrymation of the eyes after any slight exertion, by clonic blepharospasm, by spasm of accommodation with macropsia, by fibrillary twitching of the lids and muscles of the eyes, and finally by transitory diplopia.

There is hardly any need of remarking that it is not necessary for every one of these troublesome symptoms to manifest itself either in equal intensity or at the same time in one and the same patient, but it is rare that we come across a neurasthenic patient who has not, in the course of time and by the occurrence of one or another local annoyance, had occasion to complain of all of the symptoms which we have just described in detail.

The expression of neurasthenic eyes is quite peculiar: they appear to exhibit an insuperable tendency to redden easily during conversation, and are generally quite brilliant. The pupils are occasionally widely dilated, and the conjunctiva slightly injected. If the eye becomes wearied by the examination, it assumes that expression of the "breaking" eye, so difficult to describe, with relaxed and dependent upper lid. Most of the patients, even the restless ones, fix any given object sharply, but they show peculiar associated movements of the eyeballs, restlessly fixing first the left eye and then the right, of the examining surgeon. Many, also, when moving their eyes voluntarily, exhibit those quivering motions of the eyeballs which remind us of ataxia.¹

True to the principle of classification, which is based upon the previously mentioned fundamental symptoms, we shall now proceed to show, *that the so-called anæsthesia of the retina, as an expression of neurasthenic disorders, forms but one of similar links in the chain of equally valuable nervous symptoms on the part of other organs.*

We shall, therefore, first direct our attention to the

¹ Witkowski: *Arch. f. Psych. und Nerven.*, 1879, p. 443, and Michel's *Jahresbericht f. Oph.*, 1879, p. 416.

conditions of increased excitability and hyperæsthesia in other organs, in comparison with analogous and associated symptoms on the part of the eyes.

The easily irritated, moody, passionate, and excitable condition exhibited by these patients is too well known to merit a detailed description, and it is to those around them only too frequently a source of great anxiety and unjust reproaches. Almost all of them complain of difficulty in obtaining sleep; many on the contrary fall easily to sleep, but soon awaken and then seek in vain through the livelong night for the desired slumber. Others, again, cannot for a long time get to sleep, for when they have gone to bed an innumerable host of fancies rushes down like a flood upon them as they seek for rest, and still later in the form of awful and terrible dreams deprives them of the slight refreshment of sleep when at last it is tardily obtained.

The most frequent complaints of symptoms on the part of the spheres of sense are of humming and ringing in the ears. Many complain also of hallucinations of hearing: they hear children crying, they hear their own name called, and are extremely sensitive to loud talking and sometimes to every possible quality of noise. Hallucinations and hyperæsthesia of smell and taste are, moreover, by no means infrequent; in a few patients something smelt "so sharp that it felt almost unendurable," or it excited the most violent sort of headache.

The complaints of irritative conditions in the sensitive spheres are legion: the feeling of infinite weariness and depression, headaches, *clavus hystericus*, pressure on the head, migraine, supra-orbital neuralgia, occipital neuralgia, pain in the eyes, toothache, dryness in the throat, constriction around the neck, hammering in the temples, palpitation of the heart, pulsations in the body, pain in the body, intercostal neuralgia, pain in the back, formication, itching and burning of the skin, which hinders many patients from falling asleep, or increases the difficulty already mentioned of falling to sleep or from remaining for a long time in a condition of restful slumber; and finally a feeling of cold in one set of extremities and of simultaneous heat in the other.

The most prominent symptoms from the motor spheres are the restlessness and frequent change in the position and arrangement of the patients' limbs, and in many of the more intelligent a persistent and rapid alternation in the fixation of the eyes of the examining physician, especially during conditions of mental agitation.

It might, perhaps, be going too far to attribute too much importance to fifteen exhibitions of visual hallucinations in thirty patients. For they do not over frequently revisit the sufferers, and are generally looked at from the comic side. It was in two of my cases only that the patients were so terrified that one of them endeavored to fly from his supposed pursuer, while the other thought that her whole condition must be dependent upon that one hallucination. A lady whom I treated for an affection of the lachrymal apparatus, and who exhibited all of the previously mentioned characteristic peculiarities of neurasthenic asthenopia, frequently became the subject of hallucinations of sight and visual illusions during the introduction of the probe, imagining that she saw the office full of blood or the floor covered with flowers, while occasionally the bottles on the table and various objects upon the writing-desk would appear like bunches of roses. The photopsies are almost always perceived as glittering clumps of snow, shining surfaces, occasionally as colored globes and points. Some, moreover, assert that the vivid photopsies disappeared the moment that their eyes or head were in the least rotated from the position first assumed. Several patients have told me that whilst reading, the letters would look green and the paper of a different color; and one assured me that objects frequently appeared to him as if entirely covered with a reddish shimmer. The most constant symptom of all, the dazzling of the eyes by even a moderate amount of light, is probably augmented by the remarkably wide pupils.

Beard has asserted that the slight hyperæmia of the optic papilla,¹ observed by many authors in cases of anæsthesia of the retina, is a symptom of some vaso-motor disturbance.

¹ Mooren: *These ARCHIVES*, vol. x, page 281; *Nagel's Jahresbericht*, 1874, page 440; *Ibid.*, 1878, page 343; *Ibid.*, 1876, page 516.

This condition was rarely well marked in our cases, although in many it was easy to see that the optic papillæ were more abundantly supplied with blood than usual. In five of my cases I discovered what I regarded as additional symptoms of a vaso-motor disturbance, viz. : the appearance of a transient partial amaurosis,¹ with lateral defect of the field of vision and motor or sensitive disturbances of the same side of the body, accompanied with migraine and followed by vomiting. These anomalous processes in the circulatory apparatus appear under still other shapes in the form of easily provoked blushing, in an inclination to œdema mostly of the feet, by a peculiar glitter of the eye which is very piercing in many patients, and by slight injection of the conjunctiva just like that which is observed in people who have kept awake all night, in which case the indefinable complaint of burning in the eyes is moreover increased. One lady whom I had occasion to treat would often exhibit, without any assignable cause, so pronounced a chemosis of the conjunctiva of one eye that it would look as if the eye were seriously implicated, and yet in a few hours the œdema would have disappeared entirely. Another patient had frequent attacks of œdema of the face, usually of the right side, and to so excessive an amount that the eyelids would be totally closed by the swelling. In the course of twelve hours, however, this symptom would vanish. The urine was perfectly free from albumen.

The feet of a nervous boy, a patient of mine, would frequently puff up, while at other times, with equal frequency, he would suffer from œdema of the lower lip persisting for several hours. Occasionally his eyelids would be œdematously enlarged. He belonged to a family that had been terribly afflicted with neuropathy, although there was no trace of albumen in the urine nor any demonstrable alteration in the heart.

A man with slight hyperæmia of the conjunctiva complained of burning in his eyes and of a frequent red mist

¹Latham : On Teichopsia, a form of transient half-blindness ; its relation to nervous or sick headaches, etc. *Med. Times and Gaz.*, vol. xlv, page 359 ; *Nagel's Jahresb.*, 1872, page 370.

before them, and said, no doubt exaggeratively, that his eyes felt as if they were all on fire.

It is perhaps possible that the occasional difference in the size of the pupils may be explained by vaso-motor disturbances.¹

The secretory spheres exhibit symptoms which are more or less analogous to those offered by the sensitive and motor spheres. Amongst the psychical reflexes, we meet with the extraordinarily easy inclination of these patients to weep, as well as their complaint of tears upon slight variations in temperature and after moderate exertion of the eyes, although neither a catarrhal condition of the conjunctiva nor any hindrance to the passage of the tears is present. Amongst the associated conditions in these spheres we are to remember the increased secretion of perspiration and urine as well as the frequent nocturnal pollutions. Amongst other curiosities in this respect we may quote the following: One of my patients, a maiden lady of forty-five, complained that for many years, without the presence of any noticeable alteration in her left breast, it had at times secreted a large amount of milk.

The inclination to rapid weariness expresses itself in the sensorium by lack of mental energy and perseverance, by mental exhaustion, forgetfulness, absent-mindedness, and a feeling of depression. We frequently see the loquacity of the patient cut short in an instant, as it were; the thread of ideas is lost, and the supply of words, for the time being, utterly exhausted. In the case of other nerves of sense we hear complaints of occasional diminution or entire loss of the sense of smell, diminution or loss of hearing, and on the part of the nervous apparatus of vision, of :

- (a) The peculiar form of contraction of the field of vision.
- (b) Too rapid disappearance from view, of any given fixed object.
- (c) Diminution of central vision.

¹ Rembold: Ueber Pupillarbewegung und deren Bedeutung bei den Krankheiten des Centralnervensystems, Mittheil. a.d. ophth. Klinik in Tübingen. 1880; Beard, *l. c.*, page 27; Rähmann, *Volkmann's Vorträge*, No. 185, 1880, Satz 5.

(*d*) Sudden attacks of obscuration of vision, and processions of scotomata.

(*e*) Lack of fixation of the optical memory-images.

(*f*) Lack of ability to read or to work for any length of time.

(*g*) Symptoms of weariness on the part of the muscles, both of the eyes and eyelids.

(*a*) The most prominent symptom to attract our attention on examining cases of neurasthenic asthenopia is the **peculiar form of contraction of the field of vision**, which, now more, now less distinctly marked, is common to all of them, and may serve at the time as a measure of the abnormal condition of the entire optical apparatus.

We have already described the greater contraction of the field of vision toward one side more than toward the other; but in the form of this limitation of the field there are two larger and more distinct groups which, although simply exhibiting an increased intensity of one and the same condition, may yet be definitely differentiated in a diagnostic as well as prognostic point of view. In the one form, the field of vision toward the one side is above the normal, or normal or but slightly contracted toward the centre (beyond the normal in cases 2, 6, 7, 8, 11, 18; normal in cases 1, 10, 12, 16, 17, 20; or contracted a little concentrically, as in cases 3, 4, 5, 13, 15). In the second form a noticeable contraction in a high degree is present at the very beginning of the examination (as in cases 22, 23, 21, 19, 14, 9, and in the cases mentioned in note on pages 446 and 447).

Although any perfectly healthy eye will at last give out after long-continued exertion, and then exhibit symptoms more or less resembling those which we have here attempted to describe, yet these symptoms in the eyes of neurasthenic patients appear at a much earlier period and in a more decidedly intense manner. When in a healthy person the field of vision examined in an analogous manner does not, even after the prolonged examination, necessarily, reach the outermost limits of perfect perception of objects, in neurasthenic conditions, on the contrary, we can easily discern va-

rious symptoms of weariness and diminution of function, even after examination of the first meridian. Inasmuch as these forms vacillate on the border line between health and disease, we often obtain measured fields of vision, in which the greater tendency to weariness is but slightly pronounced, in comparison with those in which this symptom appears in its most pregnant form. Such transition stages, therefore, which bridge over the interval between the healthy and the pathological symptoms, are of the greatest value so far as concerns our knowledge of the so-called anæsthesia of the retina.

Still the field of vision obtained by the method described in the beginning of this paper, does not represent the absolute condition of peripheral vision, but merely the relative condition of the optical nervous activity, dependent upon the demands which are at the time made upon the function as well as the amount of work which the eyes have previously had to perform. The field of vision thus obtained is, as we may say, a product of art, which gives a sufficiently accurate key to the condition of the optical nervous energy during the examination of each separate meridian (taking into consideration the time that has already been spent in the examination); but it cannot by any means represent the absolute extent of the field of vision of the eye that has just been examined. This is, nevertheless, approximately given by the external boundary lines of the first examination, and then of the control examination of the same field of vision, presupposing, of course, that the limitation which was discovered in the meridians examined later was also produced in the beginning of the examination of the meridian concerned by over-exertion of the eye.

If we are to consider that this view has been proved by the investigations now lying before us, then the field of vision in the great majority of the cases which we have described, provided the eye has had a chance to rest, must be regarded as perfectly normal. Whilst the field of vision in the first category of cases is beyond the normal extent, or has at least normal limits in every meridian in the beginning of the examination, yet we see in the horizontal as in

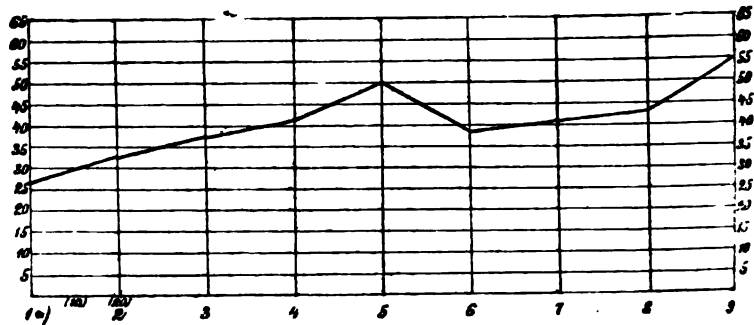
the first meridian examined that the function of the optical nervous system decreases toward the end of that meridian, until finally the white object which is used for the examination can no longer be perceived long before it has reached the normal limit of the field of vision. As the weariness increases, the visual field in each of the following meridians will become more and more contracted toward the end of each separate meridian, while the slight amount of rest which is granted to the eye as the test-object is again pushed out toward the end of the perimeter hoop and placed in a new meridian, is quite sufficient to show in a few of the adjacent meridians an almost normal extent of the field. But in the examination of the ninth meridian, as well as of the last of all in the schemata lying before us, we find even at the incipient stage of the examination a decided contraction. Still it is remarkable that, after we examine in the method suggested the five meridians upward or downward from the horizontal meridian and the eye is already moderately weary, examination of the sixth meridian, as well as of the one lying next to the horizontal, shows over and over again a less decided contraction than would have been expected from that which had already been noticed during the examination of the five preceding meridians. The cause of this phenomenon is partially to be sought for in the circumstance that in the horizontal meridian the normal field of vision shows its greatest extent, and partly in the circumstance that we are obliged to rotate the hoop of the perimeter around the whole octant, so that we thus allow the eye a longer period for rest and recovery from its previous weariness.

If we add together the number of degrees by which the visual field of each meridian falls below the extent of the normal field of vision when measured as we have suggested, and divide the sum by the number of fields thus measured (sixty-eight in twenty-four cases from thirty-six eyes),¹ we obtain the following curve, in which the ordinates² repre-

¹ The six cases, with twelve fields of a later date, are not to be counted.

² Every two meridians of the scheme invariably form an angle of twenty degrees with one another.

sent the sequence of the meridians examined, corresponding to the number placed beneath, while the abscissæ denote the number of degrees by which in every meridian the field of vision fell short of the normal extent.



Or expressed in figures :

Meridian.	Extent of the Defect.	Meridian.	Extent of the Defect.
1	26½°	6	38½°
2	32½°	7	40½°
3	37½°	8	43½°
4	40½°	9	54½°
5	50½°		

Expressed in words, this would mean that even in the examination of the first meridian, the field of vision in a neurasthenic patient, as a result of slight weariness, falls off from the normal extent at least twenty-six degrees on the average, while in the other meridians this defect is still more marked.

This curve will only suit those cases which are examined on Förster's perimeter on the above-developed principles; experience alone can tell what form the curve would assume in case of analogous examinations with other perimeters in which the eye has no opportunity to rest before being tested for subsequent meridians.

The limit of the field of vision in all of our cases was assumed to be the point at which the test-object had wholly disappeared from the perception of the examined eye.

It is, however, very evident from the following important phenomena, that the visual fields in the so-called anæsthesia of the retina, no matter by what method the examination is

made, do not exhibit the absolute value of the amount of peripheral vision that is actually present. For if we examine several times in one day, or on several successive days, the visual field of one and the same eye in apparently the same external condition at each sitting, we shall never, or at least rarely, obtain the same form and the same extent of the field as we should have expected to find from our previous examination. This is, indeed, the only way in which we can possibly explain the paradoxical phenomenon of patients with extremely contracted fields of vision in both eyes,¹ being able to walk about the house and street with perfect freedom and total lack of hesitation, although from the extent of the defects in their visual fields we should be inclined to think, and even to assert, that they could not find their way about without some one to guide them. Thus the patient with the highly contracted field in case 14 gave no hint from her movements, or her behavior, of this extreme degree of limitation, nor of the extensive diminution of vision, both of which had been objectively and accurately determined. Another patient, whom I had an opportunity of examining in the hospital, exhibited, in connection with clonic blepharospasm, extraordinary diminution of vision, and excessive photophobia, a field of vision more extensively contracted than I had ever seen in any but a few cases of glaucoma, and yet he moved about in so nonchalant a manner that for a long time I could not rid myself of the idea that he was shamming. It is possible in such cases as these that so high a degree of hyperæsthesia (or greater tendency to weariness) exists, that when called upon for more than the average amount of work (as they are for the determination of the acuteness of vision and extent of the visual field) the relative insuffi-

¹ One of my most recent cases is as follows: A young girl belonging to a nervous family, with numerous nervous constitutional symptoms, complains of a high degree of amblyopia in both eyes. S $\frac{1}{100}$, Snellen 2 when close to the eyes; micropsia. No improvement by glasses. Ophthalmoscope normal; emmetropia; reaction of pupils normal, but in each eye a colossal contraction of the field of vision, almost every meridian showing only an extent of about five degrees from the point of fixation. And yet with this enormous contraction, movements are in nowise hindered. The girl goes about everywhere just as if she possessed normal vision as well as a normal field. The color-sense is also perfect.

ciency of their nervous energy comes early into play, whilst on the contrary the absolute extent of the visual field is much greater when they can roam about at will without being obliged to fix any object with their eyes; in other words, without being compelled to exert their eyes to any great amount. Perhaps we might prove such assertions as these by examining the field of vision with a test-object 40 *mm.* □ instead of one 5 *mm.* □, in which case less exertion for peripheral vision on the part of the patient would be demanded. Nevertheless, such a comparative examination as this could not be of extreme value, from the very fact that, owing to the necessarily frequent variations in the intensity of the symptoms in every case of this nature, the visual field of one day may differ exceedingly from that of the same eye to-morrow, so that we should never be free from various sources of error in comparing the results of the two methods of examination.

The visual fields for color show about the same conditions as for white. In the last case that I have met with (see note on page 457), with extreme contraction of the visual field, all colors, even the most minute patches of color, were accurately recognized, while the visual field for these was of precisely the same extent as that for white.

One of the most interesting phenomena observed in many of these patients, during the examination for one or all of the meridians, is the repeated and intermittent disappearance and alternate reappearance and disappearance at short intervals of the white test-object. In Fig. 23 we see the result of the first examination of the visual field, and in Fig. 24 the result obtained by similar measurement after the eye had been rested for a quarter of an hour. These show the intermittency of disappearance and reappearance of the test-object just described. They also exhibit the results of the examination of the right eye in case 19, four weeks after the field in Fig. 19 had been obtained in the usual manner. In the latter figure, also, we notice some zonular defects.

Just in the same way as a frequent change in the locality of the pains, and frequent variations in the intensity of the

distress on the part of various organs, is one of the characteristics of neurasthenia, and, moreover, just as the morbid symptoms in this affection may occasionally attack but one half of the body, or at least be more pronounced on one side of the body only, so do the fields of vision in the two eyes show analogous defects (but not always with equally marked intensity), even when drawn from measurements made within one and the same hour. Case 19 with its zonular defects, and Figs. 23 and 24, show the variations to which the form of the field of vision is subjected during the brief space of even three quarters of an hour.

(*b*) Although the last-mentioned phenomena are merely concerned with the expression of the function of those nervous elements of the optical apparatus which preside over the conduction and perception of peripheral impressions of light, yet we find a precisely similar condition of things in the perception and conduction from the macula lutea. It is well known that if the normal eye gazes too long and too fixedly at any given object, the latter finally disappears entirely from the field of vision. As the conditions of which we are now speaking waver on the border line between health and disease, and as many symptoms which in an exaggerated form would be regarded as morbid must in a milder form be considered simply as the normal expressions of the healthy organism, so here also we meet with complaints which, dependent upon the vocation and livelihood of the patients, would be insisted upon by some as the most distressing, by others as the least so, of all their varying complex of symptoms. For instance, a young teacher with astigmatism capable of correction, with slight insufficiency of the internal recti, and symptoms indicating cerebral neurasthenia, came to me for advice, fearing that he should be obliged to resign his position, because, when translating or correcting the exercise books of his scholars, he noticed very frequently that the spot upon which he had but an instant before directed his eyes would suddenly grow misty, and then in an instant disappear from sight. The clinical reports of cases show us how often similar complaints are made by patients of this

class. Even during the examinations at the perimeter, the fixation-object frequently disappears from sight and then reappears, although during the entire examination the patient has not failed to keep his eyes fixed closely upon it.

(c) It is also impossible for us to fix the precise degree of **diminution of vision**, which in cases of this affection shows extreme fluctuations, although generally the sight is not greatly diminished. In case 10, *e. g.*, vision varied frequently, but could never be raised above $\frac{3}{8}$. In case 9, vision when tested directly after an examination with the perimeter, that is to say, when the eye was decidedly weary, was $\frac{3}{8}$; after resting a quarter of an hour it increased to $\frac{4}{8}$; while five weeks later, after improvement of the constitutional symptoms, it amounted to $\frac{3}{8}$. In case 15, in which vision was generally $\frac{3}{8}$, it sank from excessive weariness to $\frac{2}{8}$, just as in case 18, in which it fell from $\frac{4}{8}$ to $\frac{3}{8}$. In the latter case, also, it invariably showed a steady variation, to-day one thing and to-morrow quite different. In case 10 the same symptom was confirmed.

In thirteen of the cases cited in this paper, vision was found to be normal; in five it amounted to $\frac{3}{8}$; in four, $\frac{4}{8}$ to $\frac{5}{8}$; and in two, $\frac{1}{10}$. In some of the latter cases, however, anomalies of refraction also existed, which may have contributed partially to the diminution of vision. But it has already been proved that neither the sight nor the field of vision in their absolute extent can be so slight as they appear in case 14, as well as in the case cited in note on page 457. In explaining the diminution of vision in neurasthenic patients, we must not forget to consider the following points: It is, for instance, a fact that when these patients are *compelled to see*, they see with much less acuteness than when they test their eyes by themselves, or accidentally as it were. As in the case already so frequently mentioned (note, page 457), the patient possessed vision of only $\frac{2}{8}$, and could only distinguish common type when held extremely close to the eyes, yet she could really see so well that when riding in the horse-car, and sitting opposite her father, she called his attention to a very minute

defect in his trousers, which had entirely escaped his own attention. Since the letters at which these patients look intently disappear with great facility, so that they are obliged to give increased attention to the deciphering of printed matter, while at the same time the cerebral activity so easily tires, and, moreover, since spasm of accommodation makes its appearance at an early date, whenever increased demands are laid upon the specific energy of the eyes in their efforts to see, it is possible that the co-ordinate action of these two circumstances may explain the remarkable diminution of vision which we occasionally observe when testing the patients with type, as well as the fact that the results of the tests for near and distant vision so rarely coincide.

(d) **The duration of the attacks of obscured vision** is usually given by the patients as a few minutes, the mist falling over the sight just as if a veil had been drawn over the eyes, or the room suddenly filled with fog or cigar smoke, or a shiny membrane drawn against the eyes, then suddenly removed and so disappearing. One of the patients (case 15) was greatly terrified with this phenomenon. While sitting at the whist table every thing suddenly appeared to be covered with a thick fog, only she could still clearly distinguish (as if looking at them through a crack) the objects at which she was looking directly. Another lady (case 19) could generally see all objects that she fixed, while every thing else about her disappeared as if in a fog. It is difficult to define the precise cause of this disturbance of vision, for during the attacks the refracting media remain perfectly normal and transparent. It is possible, as Mooren has suggested (*l. c.*), that transitory œdema, originating in vaso-motor disturbances, may interrupt the conduction of light toward the cortical centres (the pupils still react promptly to light), or that as a result of over-weariness the excitability of the optical nervous system decreases to such an extent that, with all the external circumstances precisely similar, such images as are not brilliantly illuminated, and particularly those which fall upon the periphery of the retina, make a blurred, indistinct impression. In some of the cases, however, this condition of

clouded vision (or as a lady observed, "my sight appears as if covered with a dove-blue veil") persists, though not so intensely as at first, for several days in succession. It is possible that those vanishing shadows and colored or dark rings and globes which are seen by so many patients, can be explained in the same way as partial transitory amaurosis, by spasmodic conditions of the vaso-motor spheres along the nervous visual apparatus, only that in this case the conditions are much more circumscribed and transitory than in the former.

(c) Just as in neurasthenia the memory is so altered that the patients are extraordinarily forgetful and absent-minded, cannot easily concentrate their thoughts, and often, as they express it, lead a dreamy existence, even frequently exhibiting conditions which vary but little, if any, from hypnotism, so do we meet with similar complaints on the part of the visual spheres. I lately examined the eyes of a ship-broker who complained that his business was injured by the fact that the faces of people with whom he had just finished transacting business, would in the space of a few minutes entirely escape his memory. If he happened to meet these people on the street only a few minutes after they had left his store, he would pass them by without any more recognition than if he had never before seen them. He complained of the same mortifying symptoms, in his memory-pictures of houses, façades, etc. The patient was slightly hypermetropic, had perfect vision, but complained of many nervous disorders, and recalled to mind that he had always been rather "dreamy." Another gentleman complained that when he had read for some length of time, he would make out the words to signify something entirely different from their real meaning. The patient belongs to an exceedingly nervous family, suffers from migraine, and leads a fast life with women; he is hypermetropic $\frac{1}{4}$, and has perfect vision. He thinks that he used to be much more nervous during his school days than at present. He used, also, at that time to consult one oculist after another, and "for six months daily to test his eyes with various glasses," without ever having discovered but one that could help him in the

least. At the age of twenty-one he received a certificate of disability on account of his eyes and was exempted from military duty, although with his normal vision it would have been eminently proper for him to serve out his time in the army. In his youth he suffered, moreover, from all the peculiar phenomena of neurasthenic asthenopia, and even now his visual field exhibits symptoms of easily acquired weariness of the optical nervous apparatus.

(f) **The inability to use the eyes for any length of time at close work** has its foundation in the greater tendency to weariness on the part of the entire optical nervous apparatus, as well as in the more rapid fatigue of the ocular muscles and particularly of the recti interni. Indeed, we find in almost every one of these patients a more or less pronounced insufficiency of the latter muscles.¹ There is a lack of the nervous force necessary for long-continued fixation. On the part of the muscle of accommodation also we meet with a condition of relaxation, which alternating with convulsive contraction produces at one time macropsia, at another micropsia, and in connection with the insufficiency of the muscles makes the fixation-object on the perimeter, or the printed letters on the page, at one time appear as if farther off, at another nearer at hand.

I made a special examination of the breadth of accommodation in all of the cases which I have reported, and found it normal with but few exceptions. Spasm of accommodation also is occasionally present, or appears very soon after any attempts at close work with the eyes.² If hypermetropia or astigmatism is present in patients of this class, their complaints are, of course, increased by the accommodative asthenopia, while only too often does even a slight demand upon the function of the eyes produce reflex symptoms that originate in the sensitive spheres.

(g) **The transitory symptom of diplopia and the occasional appearance of slight ptosis** can also be justifiably referred to these conditions of weariness, or even paresis, as

¹ Compare also Higgens, *Nagel's Jahresbericht*, 1875, p. 507.

² Thompson: Spasm of Accommodation, *American Practitioner*, 1872, page 96. See also *Nagel's Jahresbericht*, 1872, page 454.

we may venture to call them. This phenomenon shows itself in the remainder of the muscular system by general lassitude, indolent carriage of the body, lameness in various limbs, and in the peripheral sensitive nerves by a numb feeling in the fingers, hands, and feet, and by a "going to sleep" in the legs. In the point of view of a differential diagnosis, we may venture to emphasize the fact that ptosis and sudden attacks of diplopia are by no means uncommon in the incipient stage of tabes, but that under these circumstances paretic conditions or genuine paralysis are the essential cause, and beyond this the diplopia in tabes always continues for weeks or months, while in neurasthenia it passes off in a few minutes. In thirteen tabetic patients, whom I observed for many months, I discovered six disturbances of the muscular apparatus of the eye, in two of which permanent paralysis ensued.

Inclination to reflex action toward the motor and sensitive spheres.

The extraordinarily frequent occurrence of clonic blepharospasm in retinal anæsthesia is well known, and has been mentioned by a large number of writers. After one of my patients had exerted his eyes for a short time only during the examination with the perimeter, there set in a clonic blepharospasm which gradually spread over every muscle of the face, produced clonic spasmodic nodding of the head, and at last excited general convulsions, so that I was compelled to drag the half-unconscious man away from the perimeter. The appearance of macropsia in these conditions can easily be explained by assuming a spasm of the muscles of accommodation. So far as concerns the reflex symptoms from the sensitive spheres, these patients frequently complain of headache and pain in the temples the moment that they are dazzled by artificial or any over-abundant amount of light. Förster explains this phenomenon by contrasts of illumination in the field of vision, which are more marked when artificial light is employed than in diffuse daylight. One of my patients, indeed, declared that these irresistible impressions which she felt were due to

contrasts of light. An exquisitely neurasthenic gentleman, belonging to a highly neuropathic family, and who was affected with excessive hyperæmia of the optic papillæ, could not possibly converse with people who wore well-contrasted checkered clothes, for the mere effort of looking at them would give him the most violent headache imaginable and attacks of malaise. Nor must we forget to mention at this point the *chromatophobia* of nervous people, which should, in my opinion, be properly considered as an idiosyncrasy.¹ Many patients also complain of "unendurable" pain when they exert their eyes for reading or close work, even when the existing hypermetropia has been corrected by suitable glasses, and prisms placed before the eyes to relieve the insufficiency of the internal recti.

If we have succeeded in showing that together with the symptoms on the part of the optical nervous apparatus similar and equally valuable symptoms are to be noticed from all the other nervous qualities of the entire organism, and if it is a fact that not a single case of the so-called anæsthesia of the retina produces symptoms which are specifically those of the optical nerves of special sense, but that in every one of them we can sooner or later discover analogous symptoms on the part of the other nerves, we have offered proof that the anæsthesia of the retina is not a mere local self-sufficient affection, but that it must necessarily be regarded as the local manifestation of a general neurasthenic condition, and that, as a matter of course, the entire complex of symptoms exhibited by the eye ought more correctly to be entitled "neurasthenic asthenopia." Although the cases now lying before us exhibit all the grades of intensity of this half-physiological, half-pathological phenomenon, and although in a few of them the special symptoms which belong to anæsthesia of the retina, as this term was formerly employed, are not extremely well marked, yet even the latter cases offered the unmistakable tokens of this condition, and proved without a doubt that, with the frequent variation in complaints,

¹ V. Hasner, *Centralblatt f. A.*, 1881, p. 1; Mayerhausen, *ibid.*, 1882, p. 348.

sooner or later the ocular symptoms to which we have especially devoted our attention will appear in a more pregnant form, taking it for granted, of course, that, as the history of the cases would show, they had not already exhibited them in the supposed intensity.

Rudolf Arndt compares the function of the nervous system in neurasthenics with the laws of the contractility of weary and exhausted nerves. It is well worth our while and very important from a diagnostic point of view to place side by side the symptoms observed on the part of the nervous visual apparatus in neurasthenia and those which we observe in the tabetic form, especially of atrophy of the optic nerve. In both of these conditions we find transitory disturbances of the muscular system, ptosis, hallucinations of vision, photopsies, colored mist particularly in the defective portions of the visual field, obscurations of vision, diminished acuteness of vision, dazzling by light, concentric contraction of the field of vision,—in neurasthenic asthenopia, however, without prejudice to the sense of colors and with prompt reaction of the pupils to incident light. We shall, however, show later in this paper, by citations from two cases, that in atrophy of the optic nerve from tabes also, the visual field is subject to modifications similar to those already described in cases of neurasthenic asthenopia. The appearance on the part of the nervous apparatus of vision, as well in neurasthenia as in spinal affections, of symptoms similar, yet prognostically of so diametrical importance, can be explained by the influence which the spinal marrow exerts upon the vascular distribution of the retina, as already convincingly demonstrated by Rieger and v. Forster.

The **differential diagnosis** of neurasthenic asthenopia from other severe pathological conditions of the eye, amongst which, however, only progressive atrophy of the optic nerve, glaucoma, and occasionally sympathetic ophthalmia are to be mentioned, is supported by exact conditions which enable us easily to differentiate the symptoms of the former from those of the latter pernicious affections of the eye. We are obliged in this paper to leave unmentioned the symptoms of hysterical amaurosis and amblyopia with hemi-

anæsthesia, as observed by French authors chiefly, since the material at hand is too scanty to assist us in drawing conclusions that would be sufficiently convincing for the purpose of a differential diagnosis.

Our first duty is to observe in the most careful way the general bodily condition. For it is this which offers abundant suggestions, the chief of which, and one which we cannot too much accentuate, in a diagnostic point of view, in patients who offer the most intense symptoms of neurasthenic asthenopia, is the paradoxical relation between the condition of their acuteness of vision as well as their field of vision, and their unimpeded movements and behavior. It would indeed be impossible for patients with vision reduced so low by glaucoma or optic-nerve atrophy, and visual fields contracted so concentrically, to move about so freely, as has over and over again been observed in typical cases of neurasthenic asthenopia. A second important point is the extraordinarily frequent and brusque variations in the form of the visual fields. If we are in the invariable habit of examining the field of vision by pushing the fixation-object from the periphery toward the middle point of the perimeter without following each meridian successively, and without clinging to one fixed direction upon any given meridian, until we have discovered the peripheral limit of the field for that meridian, we shall easily be liable to such an error as happened in case 19.

This patient, a healthy-looking young lady, presented herself with the complaint that she had fallen upon the back of her head a year before, and had been short-sighted ever since. She said that after recovering consciousness every thing seemed as if covered with a cloud ; she was also seriously annoyed with photopsies, and suffered from severe and frequent headache, which grew decidedly worse when she indulged in any mental exertion. Examination showed moderate myopia (the patient's mother was very myopic), with normal acuteness of vision. The ophthalmoscope revealed a well-marked hyperæmic condition of the optic papilla, together with enlargement and varicosity of the vessels. The field of vision in both eyes showed a few peripheral defects, while the field for colors, taken on the same day, showed a well-marked contraction

toward the centre. I was of the opinion, from the ophthalmoscopic condition and the history of the fall, that this was a case of some incipient neuritic process, and therefore directed the treatment suitable for such conditions. Fourteen days later I discovered normal vision with the same ophthalmoscopic condition, associated with a high degree of contraction in the visual field, so that my suspicions of neurasthenic asthenopia were at once excited. The further history of the case has been given in the previous part of this paper, while the field of vision when measured in the manner already suggested made the diagnosis perfectly clear (see Figs. 19, 23, and 24).

Another important diagnostic symptom is the prompt and extensive reaction which the pupils invariably show to incident light. Although we sometimes observe a difference in the size of the pupils, yet the phenomenon of reflex stiffness of the pupil has nothing in common with neurasthenic symptoms, and belongs to the district of organic spinal affections,—particularly of tabes. The disproportion between the ophthalmoscopic condition of the fundus of the eye and the degree of functional disturbance is common to functional diseases as to incipient organic diseases,—at least to those which begin with retrobulbar nervous affections. For, as Rieger and v. Forster have shown,¹ symptoms similar to these already mentioned on the part of the optical nerves of sense may appear in cases of organic affections of the spine without the necessary presence of alterations which the ophthalmoscope might detect. Hyperæmia, also, of the optic papilla, as occasionally observed in the preliminary stages of spinal diseases, together with a slight neuritic affection of the papilla, are of but slight value in a diagnostic point of view, since analogous conditions of hyperæmia may be witnessed in neurasthenic patients, while a slight œdema of the papilla, such as may well occur in neurasthenia, could hardly be differentially diagnosticated from a slight neuritis.

The patella-reflex is always present in neurasthenia.

If the sudden attacks of obscuration of vision should incline us to imagine that the case was one of glaucoma, we

¹ *V. Graefe's Archiv*, Band xxvii, Heft 3, p. 109.

should not forget that the colored halos observed around all artificial lights in the latter affection, are never complained of in neurasthenic asthenopia. On the contrary, the obscuration of vision is by no means rare in the incipient stages of tabes, even when there are no complications whatsoever on the part of the optic nerve. In thirteen tabetic patients whom I am now treating for affections of the eye (twelve for atrophy of the optic nerve), this symptom was noted in four. Two of these are now affected with atrophy of the optic nerve,—one had a transitory paresis of the abducens, and now has incipient atrophy in one eye ; the other patient suffers from a chronic iritis. These patients, even when in the bloom of health, years and years ago, were forced to interrupt their work at intervals, because for half an hour or an hour at a time their vision would be obscured by a thick cloud.

Nor, in making up our differential diagnosis, should we forget the vicarious symptoms exhibited by other portions of the body in the place of disturbances in the eye. Thus, *e. g.*, I remember a few cases in which the most urgent complaints of trouble in the eye disappeared like a flash, while their place was taken by similar complaints on the part of the senses of smell and taste, and particularly of hearing.

In all of these cases, except one, the sense of colors was intact, and in this the lady (case 14) simply called "red" a "reddish brown." Here the affection had lasted for years with varying intensity ; but now, after a few years, the patient sees much better. Further observations are necessary in order to determine whether cases like the one just mentioned may not in time develop into a neuritis and then degenerate into atrophy of the optic nerve, and represent, perhaps, the harbinger of that optic neuritis and optic atrophy occasionally observed in women who are sterile or suffering from anomalies of menstruation. It would seem, however, as if the cases reported by Mooren, Rieger and v. Forster would support such an idea as this.

Although glaucoma, or atrophy of the optic nerve, or

retrobulbar affections of the optic nerve, bring about a concentric contraction of the field of vision, yet some of these defects are constant and permanent, owing to the pathological lesion once caused, but chiefly to the destruction of some fibres of the optic nerve. Still, we meet here also with conditions which, with a predominant fundamental disease, can only be explained by transitory, though deeper, exhaustion of the entire nerve. In a tabetic patient with double atrophy of the optic nerves I observed the following state of affairs: one of the eyes was totally amaurotic, while in the other eye the sight had decreased most ominously within a few weeks. Examination of the visual field with a white fixation-object of 5 *mm.* □ showed deep sector-like defects, mostly outward, as far as the tenth degree of Förster's blank. The patient was very irritable and exceedingly sensitive to the very sight and proximity of a mother-in-law who lived in the same house with himself. A vacation of three weeks in the country, bodily rest, and the use of pills of silver-nitrate produced a well-marked enlargement of the field of vision, and awakened once more the perception for blue and red, which previously had entirely disappeared. Nevertheless, the diminution of vision remained as before, the stiffness of the pupils persisted, but the patella-reflex could not be produced, despite the undeniable improvement in bodily health. The indented lines (Fig. 25) show the extent of the field of vision at the patient's first visit, when, by the way, the field was not examined in the method previously detailed. The uninterrupted and interrupted lines represent the measurement and counter-measurement of the visual field according to the above-mentioned principle, after four weeks' vacation in the country. We see that the hatched defects (as they also were found by a measurement made eight days before, according to the usual method) are still present, but that within the field which has been preserved, we see indicated those very vacillations which we have found to be characteristic of neurasthenic asthenopia. This enlargement of the visual field, in comparison with the high degree of contraction at the first measurement, can only be explained by

exhaustion of the optical nervous system which had gone along, hand-in-hand, with the fundamental process, but which diminished owing to improved external conditions and therapeutic regulations, while the pathological lesion, once produced, persisted to the end.

This phenomenon was still more decidedly marked in the case of an hereditary tabetic patient, with a low degree of vision, grayish optic papillæ, hallucinations of vision, dazzling by light, vision of colored mists, reflex dilatation of pupils, absence of the patella-reflex, lancinating pains, transitory diplopia, and ataxia. I have observed this case since November, 1881, and have made six measurements of each eye without ever finding a single visual field that greatly resembled or coincided with another. The sector-shaped defects appeared in both eyes, chiefly in the temporal half of the field, and we discovered the following limitation in degrees (the field measured according to the old method).

LEFT EYE.			RIGHT EYE.		
1 Meridian	16°	OUTWARD.	1 Meridian	18°	OUTWARD.
2 "	26°		2 "	18°	
3 "	28°		3 "	6°	
4 "	26°		4 "	12°	
5 "	21°		5 "	18°	
6 "	15°		6 "	14°	
7 "	13°		7 "	18°	
8 "	19°		8 "	12°	
9 "	16°		9 "	18°	

The following visual fields (Figs. 26 and 27), lately taken on the modified principles above mentioned, show the absolute defects in the visual field outward, in an amount approaching the medium from the five previous examinations.

We see that in the tabetic form of atrophy of the optic nerve the absolute defects of the visual field show those ominous deep indentations in the shape of sectors, in opposition to the equally circular concentric contraction of the concentrically narrowed fields of vision in cases 4, 5, 9, 13, 14, 15, 19, 21, and 22. There the perception of colors was

entirely preserved ; here, however, no color is distinguished any more. Another syphilitic patient suffering from tabes, with paralysis of the right abducens, atactic symptoms, lack of knee-reflex, hyperæmia of both discs, which were slightly dotted at the external margin, had sector-shaped defects of the right temporal half of the visual field, at one point extending to the thirty-fifth degree. Here even some fluctuations occurred in taking the visual field, although a certain zone outward presented an absolute defect. The man said he had been very nervous during the last year, with fright, palpitations, and sensitiveness to noises. The pupil of the right eye, which was affected, was of medium size, reacted upon light, whereas the pupil of the left, apparently normal, eye was dilated, and showed reflective immobility. The central perception of colors was normal in both, but the peripheric was very much narrowed in the right eye, especially in its temporal portion.

Changes of symptoms and variations of their intensity are characteristics of neurasthenia. The great number of appearing and disappearing symptoms are explained from reflex excitations of the sympathetic and vaso-motor nerves. These excitations may start from and pass to any part of the body, as vaso-motor fluxions float here and there, whereas in other organs a transient anæmia is produced by spastic conditions. The brain, the digestive, and reproductive systems have to be considered as the chief centres of irritation.

In regard to the etiology, we have to distinguish two large groups, as in the one the disposition is congenital, in the other it is acquired. Although masturbation, practised too frequently and for a long time, acts undoubtedly obnoxiously upon the organism, and produces renewed complaints in nervous individuals, we cannot, from a general point of view, consider those hyperæsthetic conditions merely as a direct consequence of masturbation. One of my female patients attributed the commencement of her condition to a sudden fright. Its cause, a visual hallucination, was, however, the expression of the existing neurasthenia. In another case the symptoms followed immediately the recovery from a serious consuming disease. Very fre-

quently these conditions occur in anæmia and chlorosis. The lack of nutrition of the body in consequence of the latter may bring about mal-nutrition of the pelvic organs, with irritation of the ovaries, congestion and dislocation of the uterus. Förster and Freund (*Graefe-Sämisch*, Bd. vii) could trace conditions of that kind to a chronic atrophic parametritis in numerous cases. In case 7, and in some cases observed by Mooren,¹ the affection was caused by genital disorder after labor, so that the nervous symptoms were secondary. As, however, the disease occurs even in males, and as in many cases no genital disturbances are present, it is evident that not all cases of neurasthenic asthenopia are of an ovarial or uterine origin. These complaints are frequently met with in young girls shortly before or after the commencement of menstruation. In one of my female patients the complaints of neurasthenic asthenopia continued as long as the disorders of her first menstruation (case 10). In another one the symptoms followed immediately a serious concussion of the brain after a fall upon the occiput. This case illustrates somewhat the theory of the traumatic retinal anæsthesia.²

As in this young lady the general symptoms of neurasthenia with the ophthalmic affection were very distinctly pronounced, and the development of neurasthenia followed immediately that serious concussion of the brain, this case shows, that this so-called traumatic anæsthesia of the retina is not only to be explained by a local influence upon the nervous visual apparatus, but that the changes of the nervous system, caused by the concussion of the brain, manifested themselves in the above-mentioned manner in the eye as well as in the whole organism.

A case observed by a physician of this city in a lady proves that these symptoms may occur suddenly and ap-

¹ Mooren, J. c. Vance: The Effect of Menstrual Disorders upon the Vascularity and Nutrition of the Intra-Ocular Structure. Ref., *Nagel's Jahresb. f. Ophth.*, 1872, p. 342.

² Woodsworth: Defects of Vision Attributed to Railway Collision, *Proc. of the Med. Soc. of London*, 1881, Bd. v., p. 310; Hogg: Impairment or Loss of Vision from Spinal Concussion or Shock, *Med. Press and Circul.*, Dec. 1, 1875, p. 449; ref., *Nagel's Jahresber.*, 1875, p. 362, and Schiess-Gemuseus, ref., *Nagel's J. f. O.*, Bd. vii, p. 415, case 2.

parently without an external cause. In this case the symptoms of the eye were prevalent, and the vaso-motor disturbances appeared most evident by a sudden redness of the face and ciliary injection.

The etiological data in regard to my patients are given in the following table, with sex and age :

	Age.	Etiology.
Girls.	12 years.	Commencement of menses.
	13 "	Menses did not begin yet.
	14 "	Irregular commencement of menses, together with episcleritis.
	14 "	Chorea. Neuropathic constitution.
	15 "	Concussion of the brain.
	17 "	Chlorosis. Chorea.
	17 "	Chlorosis.
	17 "	Infantile uterus. Great menstrual disturbances.
	18 "	Chlorosis. Hereditary phthisical constitution.
	22 "	Chlorosis. Violent emotions of mind. Betrothed for many years.
	23 "	Chlorosis and menstrual anomalies.
	23 "	Cause not known.
	23 "	Uterine affections. Anteversi uteri.
	23 "	Companion of an epileptic and lunatic lady.
	26 "	Violent fright after a visual hallucination.
	26 "	Prostitute; affection of the uterus.
	30 "	Congenital nystagmus.
	60 "	Hereditary neurasthenia. Chlorosis. Menstrual anomalies.
Women.	28 "	Hysteria.
	30 "	Neuropathia hereditary in the family.
	31 "	Neuropathia hereditary. Chlorosis from childhood.
	31 "	Affection of uterus.
	32 "	Descensus uteri.
	34 "	Neuropathy hereditary.
	34 "	After a serious acute rheumatism and diphtheria.
Men.	43 "	Hereditary affections. Hysteria. Affection of uterus.
	47 "	Perineal rupture. Prolapsus uteri.
	24 "	Neuropathia hereditary. Hysteria.
	34 "	Lues. Excessive sexual indulgence and masturbation.
	44 "	Neuropathia hereditary. Exhausting pollutions.

The nystagmus of minors has to be mentioned here as an etiological moment, in which I found similar conditions as in anæsthesia of the retina. *Klin. Monatsbl. f. Augenheilk.*, 1879, p. 131.

Beard, as above mentioned, considers the cause of the disturbances in neurasthenia to be found in the vaso-motor system, and thinks that the slight hyperæmia of the optic disc, so frequently observed, is the objective proof of his opinion, saying: "Mere hyperæmia is not necessarily a

pathological condition and does not always bring about disagreeable symptoms in healthy persons ; if, however, a person is neurasthenic, a slight disturbance of circulation, a small affluxion of blood, a congestion caused by a vaso-motor paresis, noticeable perhaps only by close examination, may produce violent symptoms. By the combined action of the cerebro-spinal and vaso-motor nerves, in all their ramifications and connections, the large and small vessels are everywhere enabled to change their diameter by reflex action from any part of the body." It is, however, difficult to decide, whether those asthenopic affections have really to be attributed to this slight hyperæmia of the optic nerve, which may be observed on ophthalmoscopical examination. Observations of many cases would be necessary, showing that a large number of those symptoms disappear when the discs become paler. One of my cases seems to support the correctness of Beard's opinion. As above mentioned, the ophthalmoscopical examination in case 19 showed such a considerable hyperæmia of the discs, that I believed in a beginning neuritis for some time. As long as this ophthalmoscopical anomaly existed, the symptoms about the eyes continued. The patient called again after some weeks, with a perfect change of her symptoms. The pathological conditions of the optic nerve were entirely gone, but aural hallucinations existed, with an intermittent diminution of hearing. The fundus was normal ; only the visual field showed that remarkable form (given in Figs. 23 and 24). of an intermittent lessening of excitability.

As this affection is of an eminently chronic character, extending until the sixtieth year of age in a number of persons, and many patients either discontinue treatment or change their physician from impatience, it is difficult to observe the majority of cases during the whole course of the disease. In regard to the **prognosis**, it has to be mentioned, that these conditions may be the preliminary stage of more serious nervous diseases and psychoses. These neurasthenic asthenopic affections generally seem to involve little danger to the structure of the optic nerve, otherwise we would meet, more frequently than is really the case, with serious

complications of the optic nerve in the great majority of these patients. As the excitability of the digestive and sexual organs produces reflex symptoms in other organs, we can only think of healing these conditions, if we are able to remove the etiological moment by local treatment. Therefore, the **treatment** has to be local and constitutional in regard to the existing nervous weakness. Those cases in which the symptoms are the effect of a curable local affection, promise a much more favorable prognosis as to a perfect cure on account of the more precise therapeutic directions. Thus, in case 7, with descensus uteri, all those prominent symptoms disappeared after a colporrhaphy posterior. Only after a cohabitation they returned transiently. The most important therapeutic direction for all those patients is: Avoidance of overwork, bodily and mentally, of all exciting and weakening influences; strengthening of the patient by a regular diet, together with tonics and sedatives. The unfavorable influence of a depressed mind upon the appetite and nervous system is well known, and, if we learn from the history that the outbreak of the disease, being latent until that time, was brought about by such debilitating influences or by sudden fright, we know what kind of treatment we have to choose. In case 10 I could directly observe, in regard to the contraction of the visual field, what an influence these conditions of affect have upon the function of the eye. The young girl sat, trembling from fright (Fig. 10, the visual field with the outdrawn lines), at the perimeter. Therefore, the first drawing shows a much greater defect of the visual field than the second examination, twenty minutes later, after perfect acquiescence of the patient. If the curvature (Fig. 22) indicates how extremely quick the function of the optic nerve diminishes in direct proportion to the asked effort, and if the central acuteness of vision fell from $\frac{3}{8}$ to $\frac{1}{8}$ in consequence of overstraining, in some of my patients, there is objective evidence of the great damage which over-excitement and over-tiring may cause to the nervous system of such patients. One of my patients suffering from tabes, (whose field of vision is represented in fig. 25,) twenty-seven years old, whose left eye was per-

fectly amaurotic and the right eye was improved after staying in the country, so that he could distinguish colors again, had to interrupt his treatment on account of his only child falling ill. When the family physician explained to the parents it was diphtheria and the child's life almost without hope, the visual power of the left eye rapidly diminished, so that he was wholly blind for some hours from fright; gradually he again improved.

Von Graefe says: "In this disease I must warn against taking blood, and all weakening treatment or means which excite the nervous system or disturb the sleep. After this not only immediate deteriorations occur, but an obstinate character of the disease develops itself." In regard to the avoidance of sexual over-excitement and masturbation, it does not suit every physician to extend the anamnestic investigation to this lubric field of human passions; even I consider it as illegitimate from the professional stand-point, to extort confessions of that kind from one's patients. The opposite result will be obtained to that which the physician has to obtain, if the triumph of convincing a patient of masturbation has to be weighed against the obnoxious and depressing influence caused by the moral defeat of a man whose mind was depressed enough before. No matter whether the suspicion is confirmed or not, direct warnings tending to that point will be sure to be easily understood and thankfully accepted by the patient, who, not morally exposed, will not be detained by shame from confidentially applying to his physician again for further relief. If a large number of these patients, even in the morning in getting up, feel tired and exhausted, and every work has to be laid aside from weakness and lack of energy, it would certainly be a wrong measure to increase the weakness by overstraining to exhaustion, recommending motion in fresh air. Nearly all these patients sleep badly. In regard to this we have to combat a very common prejudice, viz.: that an excessive bodily movement is necessary in order to obtain a refreshing sleep. Opium preparations and chloral ought not to be ordered to such patients on account of their abuses and of the fact that nervous persons often

become more excited from the use of opium preparations. Bromide of potassium (5 grammes daily in a cup of an infusion of valeriana) is recommended as an excellent remedy. At the same time patients should frequently rest during the day. In many of my patients sleep returned after the use of large doses of potass. bromide, although the complaints from the visual organ continued. In the same manner, as stimulating and exhilarating influences revive the exhausted action of the nerves, we may aid these conditions by stimulating external and internal means. I have seen the greatest advantage from cold douches upon neck and back and cold rubbing. Chlorotic persons used iron and quinine. Subcutaneous injections of strychnia with a regular diet and ordination of pills of castoreum and valeriana (according to Förster) proved very useful in complaints of the visual organ. Sleep improved, the general health became better, the fog disappeared from the sight, the inclination to work returned, the visual field extended to the normal limits and hardly showed traces of the contraction before mentioned. Some of my patients wholly recovered. In order to obtain good results from strychnia, one must not take too small a dose. I injected daily three-quarters of a syringe of a solution 0.1 to 10.0,¹ without the slightest accident.

These subcutaneous injections were not of the desired effect in two of my patients, as, according to the family physician's statement, an increase of restlessness occurred in a lady with a severe hereditary hysteria, although the ocular symptoms were diminished, and in the other lady no results from strychnia could be obtained. The moderate use of wine is recommended as one of the most beneficial remedies by all, and one of my patients could entirely stop those disagreeable conditions by a glass of claret.

A physician used inhalations of a few drops of nitrite of amyl, in a case where the the vaso-motor disturbances were prominent. The lady complained mostly from disturban-

¹ For an ordinary syringe, containing 1.25 gramme — 3 i, this would be 1 gr., almost 0.01, too large a dose to begin with, according to general experience.—Ed.

ces of sight, had visual hallucinations, photopsies, and from time to time, very annoying obscurations of vision, with an increased redness of the face and ciliary injection. The inhalation of a few drops of nitrite of amyl controlled the symptoms at once. The obscurations were, perhaps, brought about by transient slight anæmia of the retina, and subsided after dilalation of the retinal vessels by the inhalation of nitrite of amyl. The same effect was observed by Deutschmann (*Archiv f. Ophth.*, Bd. xxvii, p. 1) in atrophy of the optic nerve. As this remedy causes great congestion of the head, it ought to be used only in those cases where no intra-ocular abnormalities exist. In one case of my practice, in which there was a very high degree of myopia, besides very marked symptoms of neurasthenia, with changes of the yellow spot and inclination to repeated hemorrhages in the retina, this remedy was not allowed on account of the vaso-motor character of all the symptoms and tendency to retinal hemorrhages.

A frequent change of remedies is especially to be recommended, as the confidence of the patients in a new medication may help to secure the effect. Many of these patients visit the oculist on account of asthenopic complaints, and after a superficial examination, one is apt to believe to have cured the trouble by prescribing glasses, as in most cases a slight insufficiency of the internal recti muscles is observed. Instead of benefit, we meet with new complaints and troubles, caused by the glasses, which soon are laid aside. The reflex of light from the glasses "dazzles and causes pains in the temples and in the eye." The pressure of the frame upon the nose and temples produces an "intolerable sensation," and the new troubles are so intense as to prevent the patients from the use of the glasses, although they confess that the vision is improved by them. Mooren has found frames of tortoise-shell the most useful in such cases. In order to diminish the dazzling, blue or gray glasses should be used,—according to the feeling of the patient.

Frequent rest should be ordered in a moderately-illuminated and quiet room; reading, needle-work, or piano-playing should not be allowed. Easy work in the house or

garden, taking care of flowers, or any occupation which keeps the patient active without overtaxing his strength, has always been of the greatest advantage. Sea-bathing or iron-baths, in places with good air, woods, and pleasant surroundings, will complete the cure. Beard highly recommends faradization of the whole body, and the galvanic current at the head and vertebral column. I could prove the beneficial influence of this treatment in three of my patients, one of whom called it his "temporary savior." Many patients call on the oculist, frightened by the serious symptoms from the eyes, and upon the assurance that their disease is "merely nervous," they go away without inclination and patience to undergo any further treatment. One will be very much disappointed in believing to have cured the affection permanently by a short treatment with transient success. At short intervals relapses will occur, for a change of symptoms and of locality is a characteristic feature of neurasthenia, although the troubles from the eyes may be relieved for some time. The affection is chronic with an intermittent character.

It is difficult to decide whether these patients belong to the care of the oculist or neuro-pathologist in a specialistic sense, but it may not be easy for the general practitioner and neuro-pathologist to put some incident symptoms, which may easily be taken for serious organic affections of the optic nerve, into the category of merely functional disturbances of the optic nerve, without consulting an ophthalmic surgeon. Beard was accustomed to treat his cases in consultation with a gynecologist and oculist.

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1879. 70 HUTCHINSON, J., On hyperæsthesia of the eye. *Med. Times and Gas.*, Aug. 23, p. 199; *Nagel's Jahresh. f. Ophth.*, p. 405.
1879. 71 WITKOWSKI, L., Ueber einige Bewegungserscheinungen an den Augen. *Arch. f. Psych. und Nerv.*, p. 443; *Michel's Jahresh. f. Ophth.*, p. 416.

1880. 72 GEISSLER, Ueber die vorzugsweise beim weibl. Geschlecht vorkommenden Augenerkrankungen. *Berl. kl. Wochenschr.*, p. 246.
1880. 73 SCHELL, *Michel's Jahresb. f. Ophth.*, p. 446.
1880. 74 POWER, H., The diseases of the eye occurring in connection with pregnancy. *Lancet*, Bd. i, p. 829.
1881. 75 ADAMS, Uniocular Diplopia., *Centr. f. Augenh.*, p. 463.
1881. 76 BEARD, Die Nervenschwäche, übersetzt von Neiser. Leipzig bei Vogel.
1881. 77 MOOREN, Gesichtsstörungen und Uterinleiden. *Arch. f. Augenh.*, Bd. x, p. 519.
1881. 78 LANDESBURG, On affections of the eye caused by masturbation. Ref. *Arch. f. Augenh.*, Bd. xi, p. 141.
1881. 79 WOODSWORTH, J. C., Defects of vision attributed to railway collision. *Proc. of the Med. Soc. of Lond.*, Bd. v, p. 310.
1882. 80 ARNDT, Realencyclopädie d. gessammt. Heilkunde von Eulenburg, Bd. ix, p. 559.
1882. 81 COHN, H., Augenkrankheiten bei Masturbanten. *Arch. f. Augenh.*, Bd. xi, p. 198; these ARCH., vol. xi, p. 428.
1882. 82 BERLIN, Ueber Analogie zwischen sog. Commotio Retinæ und der Gehirnerschütterung. *A. f. Psych.*, Bd. xii, p. 253.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY DURING THE FIRST
QUARTER OF THE YEAR 1883.

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Translated by Dr. F. E. D'OENCH, New York.

A.—GENERAL OPHTHALMOLOGICAL LITERATURE ;
GENERAL PATHOLOGY, DIAGNOSIS, AND THERA-
PEUTICS ; NORMAL ANATOMY AND PHYSIOLOGY.

By H. MAGNUS, M.D.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIO-
GRAPHICAL, AND HISTORICAL SUBJECTS.

1. BERLIN and REMBOLD. Investigations on the influence of
writing on the eyes and attitude of the body of school-children.
Stuttgart, 1883.

2. DE CHARDONNET. La lampe Edison et l'hygiène de la
vue. *Acad. d. sci.*, Feb. 19, 1883. Edison's lamp is recom-
mended.

3. LE CONTE, Jos. Sight. *Internat. wissenschaft. Bibl.*, vol. LV,
Leipzig, 1883, xii, 26.

4. FIEUZAL. Bulletin de la clinique nationale ophthalmologique de l'hospice des quinze-vingts. Paris, 1883. Tome 1, No. 1. Will be published as a quarterly. The first number contains a report on the history, equipment, and number of patients at the Paris hospital des quinze-vingts.

5. GALEZOWSKI and DAGUENET. Diagnostic et traitement des affections oculaires. Paris, 1883. Baillière et fils, No. 1 contains: Conjunctiva, cornea, sclera, iris. The whole will be published in instalments and be complete in three volumes.

6. JOSTEN. The provincial ophthalmic institute at Münster. *Klin. Monatsbl. f. Augenheilk.* Description of the newly-erected institute, with a design of the ground-plan.

7. M. REICH. Ophthalmic report of the Caucasian military district for 1880 and 1881. *Wojénno-Medicinsky Journ.*, Nov. and Dec., 1882.

8. SCHUBERT. The text-books used in the schools of Nuremberg from an ophthalmic point of view. Rep. of the Sanitary Soc. of Nuremberg, No. 5. Schubert endeavors to formulate the scientific demands upon a book, and tests the school-books of the city from an ophthalmic point of view.

9. WEBER. A new era in the hygiene of the schools of the Grand Duchy of Hessen. *Klin. Monatsbl. f. Augenheilk.* See *antea*.

BERLIN and REMBOLD (1) come to the following conclusions:

The present slanting system of penmanship should be retained.

The following rules should be adopted in the schools:

1. The inclination of the letters—*i. e.*, the angle which the downward stroke makes with a line perpendicular to the ruling of the paper—should be 35° – 40° .

2. The book should not be placed to the right, but as nearly as possible before the median line of the body, and so inclined that the direction of the writing rises from the left and below to the right and upward at an angle of 30° – 40° . When in the proper position the downward stroke is perpendicular to the table's edge, and the centre of the line just being written opposite the median line of the body.

3. The position of the body essentially corresponds to the rules laid down in § 2 of the ordinance of 1868, to which only a few additions need be made, so that the sections of this paragraph

reads as follows : (a) The upper part of the body remains upright as far as possible, so that it is supported by the spinal column, which is prevented from becoming tired by resting its lower portion against a support. (b) The transverse axis of the body, the connecting line between the shoulders, is parallel to the longer edge of the table, and an oblique position of the upper part of the body is therefore not justifiable, as is recommended by some teachers for the acquisition of a neat, slanting style of writing. (c) The body must not be pressed against the edge of the table, but kept at a distance of about 3 *cm.* from it. (d) The head, whose transverse axis is also parallel to the longer edge of the table, is lowered but slightly toward the latter, and not more than is necessary to obtain a suitable angle between the visual plane and the surface of the table. (e) The elbows must be kept a little lower than the edge of the table and at an equal distance from the body ; this distance should be neither too great nor too small, but has a certain margin within which it depends upon the height of the shoulder above the edge of the table. (f) The forearms, not the elbows, are laid upon the table in an almost symmetrical position, the book being placed in the median line of the body. (g) The position of the feet is the same as in the original rules.

4. This position of the body is to be maintained during the whole act of writing, the upper part of the body and the upper arms to the point of support of the forearms upon the table's edge remaining quiet, and the hand and forearm alone performing the act of writing. In regard to the latter the following directions should be observed : (a) The movements necessary to produce the letters and single words must be performed by the joints of the fingers and the wrist. (b) The right forearm must not move its point of support upon the table's edge outward as the writing advances along the line, but must revolve about it as a centre, thus describing an arc upon the table. The anterior portion of the hand would thus describe an arc with a long radius, the ruling forming the chord, so that in order to keep the writing in a straight line, the distance of the anterior portion of the hand from the point of support must be slightly increased as the centre of the line is approached, and then again gradually diminished. This diminution should not be produced by withdrawing the forearm, but by a slight bending on the finger-joints and wrist. In order to facilitate adherence to these directions, it is advisable, especially in smaller children, to shorten the lines.

(c) When a new line is begun, the forearm must describe the same arc backward with greater rapidity. As the distance between the anterior portion of the hand and the point of support of the elbow diminishes, the more lines are written ; this decrease should be counteracted, not by withdrawing the forearm, but by bending the wrist and finger-joints, and when this is no longer possible, by withdrawing the book with the left hand. This latter motion of the left hand must not be performed by changing the point of support of the left forearm upon the table's edge, but either by a movement of the wrist or a slight rotation of the left forearm about its point of support.

5. The head also must not change its position ; the slight rotation from left to right in writing is not injurious.

III. The school-board and teachers should sufficiently understand the necessity and importance of these directions, so as to enforce them with the proper intelligence and energy. The best means to accomplish this would seem to be the embodiment of a short abstract of Berlin and Rembold's report in the regulations of writing.

IV. In view of the deleterious consequences of a too close approach of the eyes in writing, and the fact that in the youngest children this is the case to a very high degree, producing most unfortunate results, which for anatomical reasons cannot be obviated by changing the regulations, the following suggestions are made :

1. Reading and writing, playing with small objects, in general work requiring close vision, should be forbidden in the schools for younger children, the Kindergartens, etc. ; whence the children frequently enter school with eyes already myopic.

2. Instruction in writing should be limited as much as possible the first year ; reading of distant objects (black-board) should first be taught, then of books, and finally, writing, the time not extending beyond half an hour the first years, and limited to 5-10 minutes, followed by a pause of a few minutes.

3. The letters should be large, symmetry and beauty being of less importance.

4. The slanting lines of the black-boards and books should be omitted.

5. Writing, especially at home, should be limited as much as possible, and permitted only when the child's home is sufficiently light and airy.

5. The teachers should impress the children with the importance of assuming the correct attitude when writing at home. Instruction of the parents on this subject would also be desirable.

CONTE (3) intends to publish a book which will prove equally valuable to the layman and specialist. The greater part of it is devoted to the laws of binocular vision, and as he discusses in detail various doubtful questions, the book will undoubtedly prove useful.

REICH (7) discusses, in his very minute report, circulars and orders in regard to the prevention of ocular affections and epidemics in the army, and the reports on the condition of the soldiers' eyes of the Caucasian district; he also minutely describes the Caucasian hospitals which have ophthalmic wards. There are three such hospitals in the Caucasus: the first Tiflis Hospital and the hospitals at Kars and Wladikawkas. In 1881 ophthalmic wards were also established in the hospital at Karakliss. In the three hospitals named above, 1,200 (including out-door patients) were treated and 155 operations performed (in 1880 only 70). The report contains a very detailed schedule of all the ocular affections in the different regiments and military divisions, with a reference to the hygienic conditions; reports on the number of trachoma-patients; on the state of refraction of the pupils of the military schools; on the vision of the soldiers of the Caucasian district (23,292 men); on the number of the blind and the causes of blindness.

HIRSCHMANN.

b.—STATISTICAL PAPERS.

10. ALEXANDER. Fourth report of the ophthalmic institute of the district of Aachen. Aachen, 1883. 2,025 new patients.

11. J. J. CHISOLM. Fifth annual report of the Presbyterian Eye and Ear Charity Hospital. 3,229 eye-patients; 53 extractions according to v. Graefe, 48 iridectomies, 99 squint-operations, 31 enucleations, 4 neurotomies.

BURNETT.

12. GLEIWITZ. Second annual report of the directors of the society for supporting the Gleiwitz Eye and Ear Hospital, Oct. 1, 1881, to Sept. 31, 1882. 1,889 patients; 99 operations.

13. HALTENHOFF. Troisième rapport de la clinique ophthalmique du Molard. Geneva, 1883.

14. HIRSCHBERG. Annual report for 1882 of Prof. Hirsch-

berg's ophthalmic institute. 7,478 patients ; 341 important operations, 46 extractions (two of them failures).

15. JANY. Eighteenth annual report, for 1882, of Dr. Jany's ophthalmic institute at Breslau. Breslau, 1883.

16. MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY. Fifty-seventh annual report for the year 1882. Boston, 1883.

17. PFLÜGER. Annual report of the ophthalmic clinic of Berne University for 1881. Berne, 1883.

In 1882 JANY (15) treated 3,507 new patients ; total number, 56,737. Sixty extractions, according to v. Graefe, were performed, one of them being a failure and eight moderate results. Total number of operations on the lens, 114. Two cysticeri were extracted from the vitreous ; in one case a chip of iron was removed from the vitreous with an electro-magnet. A short discussion on blindness in Prussia precedes the report.

In the Massachusetts Infirmary (16) 7,185 new patients were treated in 1882 ; 84 senile cataracts were operated according to v. Graefe. These extractions are minutely discussed in a statistical table. The 7,185 diseases are distributed as follows : lids, 645 ; conjunctiva, 1,883 ; cornea and sclera, 1,504 ; iris and ciliary body, 307 ; choroid, 158 ; retina, 40 ; optic nerve, 66 ; vitreous, 21 ; lens, 276 ; injuries, 86 ; amblyopia, 89 ; refraction and accommodation, 845 ; muscles and nerves, 227 ; lachrymal apparatus, 235.

In Berne (17) 1,036 patients were treated in the dispensary, and 302 operations were performed : 40 frontal extractions, 9 of them in the capsule ; no failure. Antiseptic treatment was adopted, for operations: 1 % carbolic, with 4 % boracic, acid. The same solution was used for cleansing before the operation. It was also used in cases of injury. Pflüger is opposed to Credé's prophylactic method of treatment of blennorrhœa, and believes that unfavorable results will soon be reported. The reviewer does not share this view, uniform success having been reported thus far. Of the large number of clinical histories one is especially interesting, it being the genealogy of a family in which hemeralopia, combined with a high degree of myopia, is hereditary. The same law which has been shown to hold good in red-green blindness is always followed here, every other generation being affected.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY AND DIAGNOSIS.

18. v. CHEUVREUL. Précis historique et pratique de l'examen de l'œil et de la vision. Paris, 1883, Masson.

19. v. JAEGER. The diagnosis of diseases of the blood with the ophthalmoscope. *Wiener med. Wochenschr.*, 1883, No. 9.

20. v. KARWAT. Contributions to the affections of the eye in atheroma of the carotid. Inaug. Diss., Würzburg, 1883.

21. SCHMIDT-RIMPLER. Contribution to the knowledge of some results of contusion of the globe. *Arch. f. Augenheilk.*, vol. xii, 2.

According to KARWAT (20) the nutrition of the lens is impaired in atheroma of the carotid, a circumstance which materially favors the development of cataract. Embolism of the central retinal artery may also result.

SCHMIDT-RIMPLER (21) reports some very instructive clinical cases, and calls especial attention to the fact that contusions of the globe result in pathological changes at the macula which cause marked visual disturbances. This disposes of Berlin's explanation, according to which they are due to irregular astigmatism of the lens.

b.—THERAPEUTICS.

22. ABADIE. On accidents immediately after cataract-extraction. *Soc. française d'ophth.*, Jan., 1883; *Rec. d'ophth.*, Feb.

23. ANDREW. Extraction of the lens in the capsule. *Brit. Med. Journ.*, Jan., 1883.

24. CHAVERNAC. Extraction de la cataracte. Retour de la méthode de Daviel. *Ann. d'ocul.*, 1883, i.

25. COWELL. On certain modifications of A. v. Graefe's linear extraction. *Brit. Med. Journ.*, Jan., 1883.

26. GALEZOWSKI. On extraction of cataract with or without excision of the iris. *Soc. franç. d'ophth.*, Jan., 1883; *Rec. d'ophth.*, Feb., and *Lancet*, No. 3.

27. HIRSCHBERG, J. On extraction of chips of iron from the interior of the eye with the magnet. *Gesellsch. d. Charitéärzte*, Jan. 4, 1883. *Centralbl. f. prakt. Augenheilk.*; *Berl. klin. Wochenschr.*, No. 5.

28. HOLSTEIN. Antiseptics in ophthalmology. Inaug. Dissert., Berlin, 1883.

29. E. G. LORING. Premature delivery for the prevention of blindness. *N. Y. Med. Journ.*, Jan. 20, 1883.

30. MONTALDO. Los antisépticos en oftalmología. *Buletina de medicina naval*, Cadiz, Jan., 1883.

31. SNELL. On extraction of cataract by a shallow lower flap. *Brit. Med. Journ.*, Jan. 13, 1883.

32. TERSON. On means for preventing suppuration of the corneal wound after extraction in dacryocysto-blennorrhœa. *Soc. franç. d'ophth.*, Jan., 1883; *Rec. d'ophth.*, Feb.

33. DE WECKER. Quelques perfectionnements apportés à l'extraction de la cataracte. Gand, 1883. Abstract of an article in the Nov.-Dec. No., 1882, of the *Ann. d'ocul.*

34. WICHERKIEWICZ. The technique of iridectomy. *Centralbl. f. prakt. Augenheilk.*

ABADIE (22) distinguishes two kinds of accidents after cataract-extraction, those which immediately follow the operation and those which manifest themselves later.

ANDREW (23) prefers Macnamara's method of forming a large temporal flap under narcosis and extracting the lens with a spoon. In some cases iridectomy also is performed, especially when the pupil cannot be sufficiently dilated.

According to COWELL (25) the best results are obtained with v. Graefe's method, modified as follows: 1. The pupil is dilated in the morning; 2, anæsthetics are always administered; 3, the section lies in the cornea, but very peripheric in order to be sub-conjunctival.

GALEZOWSKI (26) recommends extraction without excision of the iris, as inflammation can then be more easily avoided.

HOLSTEIN (28) criticizes the various reports on antiseptics in ophthalmology, and comes to the following conclusions: 1. The great danger of septicæmia which threatens the body after severe surgical operations need not be feared in ophthalmology, as the intra-ocular pressure and firm fibrous envelopes of the globe make septicæmic infection of the body very difficult. Therefore antiseptic treatment is unnecessary. 2. The serpent ulcer, dacryocysto-blennorrhœa, and the specifically infectious conjunctival blennorrhœas should be treated with antiseptics on account of their septic nature. 3. The strict antiseptic bandage according to Lister cannot be applied to the eye, as it is not practical, irritates on ac-

count of the concentration of the solutions of carbolic acid, and especially as the eye is in anatomical connection with the cavities of the mouth and nose. The spray also should be discarded, as its power to destroy bacteria is doubtful, and because it produces irritation and befogs the field of operation. 4. Antiseptic treatment, as practised thus far in ophthalmology, has at times given good results. But it gives no reliable protection either, as a large number of losses may occur in rapid succession. Boracic acid has thus far proven the best antiseptic, as it does not irritate and still disinfects; for disinfecting the instruments, absolute alcohol and benzoate of sodium. Equally good results are obtained by the separation of materials (?—ED.) and scrupulous cleanliness in an aseptic institution, so that it must be ranked as at least equal to the antiseptic treatment.

LORING (29), in an elaborate paper, advises premature delivery, not only in those cases in which albuminuria accompanied by retinitis has been shown to exist, but also in all those cases in which diminution of vision during pregnancy is plainly marked. He cites a case from his own practice in which the result was good; he also reports cases of other authors. BURNETT.

TERSON (32) makes the incision downward in dacryocysto-blennorrhœa, and injects boracic acid (4 %) into the tear-ducts.

In making an iridectomy for optical purposes, WICKERKIEWICZ (34) seizes the iris with a blunt silver hook when he wants a small coloboma.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL AIDS.

35. BADAL. Verres périscopiques et cônes de Steinheil. *Ann d' ocul.*, Jan. and Feb., 1883. General remarks.

36. COURSSERANT. Nouvel ophthalmoscope à deux observateurs. *Soc. franç. d' ophth.*, Jan., 1883; *Rec. d' ophth.*, Feb., 1883.

37. DESPAGNET has put together a small pocket-case for the oculist; it is made by Mariand, Paris. CHIBRET showed it to the *soc. franç. d' ophth.* MARCKWORT.

38. HIRSCHBERG. Fixed keratoscope. *Centralb. f. prakt. Augenheilk.*, Jan., 1883.

39. JAVAL. Troisième contribution à l'ophthalmométrie.

Description de quelques images k ratoscopiques. *Ann. d' ocul.*, Jan.-Feb., 1883; *Soc. fran . d' ophth.*, Jan., 1883. The method of measuring the cornea resembles that of Placido.

40. KLAUNIG. The artificial eye. Leipzig, 1883, vol. vi, p. 58. *Vid.* also KLAUNIG, on glass eyes. *Med. Fahrbb.*, vol. cxcii, No. 2.

41. LANDOLT. Ophthalmo-dynamom tre. *Soc. fran . d' ophth.*, Jan., 1883; *Rec. d' ophth.*, Feb., 1883. Measures the breadth of accommodation and convergence.

42. MORTAIS. On strabismus-spectacles. *Soc. fran . d' ophth.*, Jan., 1883; *Rec. d' ophth.*, Feb., 1883.

43. SCHMIDT-RIMPLER. Determination of refraction in the inverted image. *Zeitschr. f. Instrumentenkunde*, November, 1883.

44. ST BER. Echelle pour d terminer la simulation de l' amaurose unilat rale et l' acuit  visuelle. *Arch. d' ophth.*, vol. iii, 3.

COURSERANT (36) demonstrates an ophthalmoscope for two observers, constructed by Nachet ; it depends upon the fact that platinized glass partly reflects incident rays, partly allows them to pass through.

MARCKWORT.

KLAUNIG (40), in an elaborate paper, has touched upon all points in regard to the artificial eye which are of interest to the physician and patient. It is well worth reading.

MORTAIS (42) prescribes strabismus-spectacles immediately after the operation. The good eye remains closed. According to the degree of strabismus, the position of the vertical slit varies.

In determining refraction in the inverted image, SCHMIDT-RIMPLER (43) proceeds upon the following principle : If a concave mirror of moderate focal length (about 5 inches) is used in examining by the indirect method, its inverted and smaller image, which generally lies between the lens and ophthalmoscope, forms the source of light for the fundus. This image must form another bright and distinct one upon the retina of the eye examined, and be visible with the ophthalmoscope when the retina lies in the conjugate focus of the first image—in other words, when the refraction of the eye corresponds to the position of the second image ; otherwise it is indistinct. By approaching and withdraw-

ing the mirror, the image formed at its relative focus can be produced at varying distances from the lens held before the eye, and determine the one which corresponds to the refraction of the eye. A well-defined image of the flame will then be seen upon the retina. In order, then, to determine the refraction of the eye, it is only necessary to know the distance of the first image from the convex lens in this position of the mirror. This is given when the distance of the mirror from the lens and the relative focal length of the mirror are known; the latter deducted from the former gives the distance of the image from the lens. Both values can easily be found by measurement. When the lens is held at a distance from the eye equal to its principal focal length, the refraction can readily be determined from the formula $\frac{f}{n}$ (where f represents the focal length of the convex lens, and n the difference between the position of the image [B] and the principal focal length). No calculation, however, is necessary if a convex lens of 10 D is used and held at a distance of 10 cm. from the eye; every centimetre difference between the focal length of this lens and the position of the image represents one dioptre. If B, measured in cm., is greater than 10, there is hypermetropia; if less, myopia. For instance: if $B = 12$, there is H 2 D (i. e., $12-10$); or if $B = 8$, there is M 2 D ($10-8$); or if $B = 10$, there is E. In order to judge of the clearness of the retinal image with greater accuracy, Schmidt-Rimpler replaces the ordinary light of the lamp by a bright object divided by fine lines. A piece of netting is used for this purpose. Schmidt-Rimpler has constructed a special instrument for making the measurements and holding the lens, which can be obtained from Holzhauer, in Marburg.

STÖBER'S (44) plate consists of a number of squares of red and green glass of various sizes, on which test-types (Monoyer's) are pasted. A spectacle-frame containing a red and a green glass is placed before the eyes of the simulant, and if he reads both red and green types, his attempt to deceive is apparent and his vision about determined. (This test was described by Snellen in *Zeh. klin. Monatsbl.*, several years previously.—ED.)

b.—REMEDIES.

45. CHISOLM. Bromide of ethyl, the most perfect anæsthetic for short, painful surgical operations. *Maryland Med. Journ.*, Jan. 1, 1883.

46. LEWIN. Boracic acid and its uses in practical medicine. Inaug. Dissert., Bonn, 1883.

47. DAVID WEBSTER. Sulphide of calcium in ocular affections. *Arch. of Med.*, Feb., 1883.

According to CHISOLM (45), bromide of ethyl is only desirable for a short narcosis, which can be produced in a minute, but only lasts 2-3. It is therefore not adapted for larger operations, like enucleation, extraction, etc. It does not produce nausea.

LEWIN (46) recommends boracic acid, which was introduced by Graefe into ophthalmology, for bandaging after extractions, and in those cases of conjunctival catarrh in which the secretion shows a tendency to coagulate. Boracic acid should be used when nitrate of silver is contra-indicated, and carbolic acid cannot be used as it affects the cornea. It is especially effective in so-called atropine-conjunctivitis.

WEBSTER (47) has employed sulphide of calcium in certain ocular affections, and claims good results in the so-called scrofulous (strumous) inflammations, like phlyctenular keratitis and conjunctivitis, corneal ulcers, ulcers with hypopyon, kerato-iritis with hypopyon, episcleritis, interstitial keratitis, etc. He usually gives a dose of $\frac{1}{10}$ of a grain (0.006) four times daily.

BURNETT.

IV.—ANATOMY.

a.—GENERAL ANATOMY.

48. BENDALL. The preparation of the tissues of the eye for microscopical examination. *Ophth. Rev.*, March, 1883.

49. HÖLTZKE. Microphthalmus and coloboma in a rabbit. *Arch. f. Augenheilk.*, vol. xii, 2 ; these *ARCH.*, vol. xii, p.

50. SMITH. Modes of preserving and coloring ophthalmic specimens. *Ophth. Rev.*, March, 1883.

b.—LIDS, CONJUNCTIVA, CORNEA, LACHRYMAL APPARATUS.

51. DENISSENKO. Investigations on the nutrition of the cornea. *Wratschebnyja Wjedomosti*, 1883, Nos. 9-12.

52. RETTERER. Sur la génération des cellules, le renouvellement de l'épiderme et des produits épithéliaux. *Communication à l'académie des sciences*, Feb. 13, 1883.

After a close analysis both of his own observations and those

of others, DENISSENKO (51) comes to the following conclusions : (1) The cornea is not nourished from the anterior chamber, but by the surrounding blood-vessels in the sclera. (2) The nourishing liquid is conducted in the vessels through the fibre-bundles and fissures of the sclera to the corneal margin, where it is distributed throughout the entire thickness of the cornea by means of the lacunæ and fissures, and finally is discharged into the anterior chamber. (3) The current in the cornea moves from the periphery toward the centre and from the surface toward the interior. (4) The stomata of the epithelium of Descemet's membrane also serve to discharge the liquid, which has served its purpose. (5) The anterior chamber is an enlarged duct for discharging the lymph-vessels of the cornea. (6) In Bright's disease, the œdema of the cornea is mainly due to a closure of its ducts opening into the anterior chamber. (7) When Schlemm's canal is closed (on account of swelling) the cornea is also thickened ; its spaces are distended with liquid, while their physiological form remains unchanged, and if Schlemm's canal again becomes permeable, the cornea also returns to its normal condition. In morbus Brightii the œdema is more marked ; the distended spaces tear and form larger cavities. The cornea loses its shape in consequence, and returns to the condition with great difficulty. (8) The physiological theory of the cause of œdema (Magendie, Cohnheim, Lichtheim) does not explain the œdema of the cornea ; the theories of Ranvier and Roth, however, are satisfactory. (9) The dimness of the fundus and the reduction of vision must not be referred to retinal changes only, but also to pathological changes of the cornea. (10) The detachment of the endothelium in metastatic irido-choroiditis is due to an accumulation of liquid between the elastic membranes and the endothelium. (11) The cells of Descemet's membrane may contribute to the increase of the hypopyon, but do not cause it. (12) In the horse and other animals, whose retinæ contain no blood-vessels, the retina is nourished as in birds.

HIRSCHMANN.

C.—VITREOUS AND LENS.

53. BAYER. On the visible canal of Cloquet in the human eye. Verein deutscher Aerzte in Prag., Jan. 19, 1883. *Wiener med. Presse*, No. 5.

54. O. BECKER. On the vortex and nuclear arch in the human lens. *Arch. f. Augenheilk.*, vol. xii, 2; these ARCH., vol. xii, p. 169.

55. DESSAUER. The question of the zonula. *Klin. Monatsbl. f. Augenhch.*

56. HOCQUARD et ALB. MASSON. Étude sur les rapports, la forme et le mode de suspension du cristallin à l'état physiologique. *Arch d'ophth.*, vol. xii, 3.

57. PRIESTLEY SMITH. Growth of the crystalline lens. *Ophth. Soc. of the Unit. Kingd.*, Jan. 11, 1883. *Lancet* No. 3; *Brit. Med. Journ.*, Jan. 20, 1883.

According to DESSAUER (55) the zonula closely applies to the flat portion of the ciliary body and to the ciliary processes, and presents an exact impression of the latter when carefully removed. In the new-born and adult the zonula has no connection with the hyaloid membrane. There are no regularly arranged cells or nuclei, which would indicate the existence of an endothelial layer upon the zonula. Spaces may exist between the zonula and vitreous, but not between the zonula and ciliary processes.

According to the investigations of HOCQUARD and MASSON (56) the zonula consists of a system of fibres entirely independent of each other; these are joined by supporting fibres as they pass forward, which spring from the pars cil. ret. and pass obliquely from in front backward, and *vice versa*. Thus a net-work is formed, held distended by the ciliary processes, which impress themselves upon it like fingers upon a stretched net. The fibres of the zonula are formed of fibrils which spring from (1) the hyaloid membrane, (2) the ora serrata, (3) the basal membrane of the pars cil. retin. This structure of the zonula excludes the existence of Petit's canal, but increases the size of the posterior chamber, extending it to the ora serrata. During accommodation the zonula, whose different bands can move upon the hyaloid membrane, is slackened by the advance of the choroid and fixed in its new position by the ciliary processes, which are pressed against the sclera by a peculiar muscular apparatus, which thus far has been considered a circular muscle, but which produces the opposite effect, and in this respect and in its arrangement corresponds to the interscleral fibre-bundle of the ciliary muscle of the chicken.

V. MITTELSTÄDT.

According to SMITH (57) the mean weight of the lens increases every year about 1.5 milligrammes, the mean volume about 1.5 cubic millimetres. This continuous growth of the lens explains the peculiar optical changes of the eye as age comes on, and the

senile shallowness of the anterior chamber. The continuous growth of the lens results from the epidermoid structure of the substance of the lens enclosed in the capsule.

d.—RETINA AND CHOROID.

58. BOUCHERON. De l'épithélium aquiré et vitréifié des procès ciliaires. *Soc. franç. d'ophth.*, 1883. *Rec. d'ophth.*, Feb. 1883.

59. GOLDZIEHER. Contributions to the normal and pathological anatomy of the choroid. 1. The nerves of the suprachoroid. *Centralbl. f. prakt. Augenheilk.*

60. OSTWALST. Experimental investigations of the central reflex of the retinal blood-vessels. *Centralbl. f. prakt. Augenheilk.*

The outermost layer of the choroid (59) must be considered as a nerve-layer, on account of the great number of nerves and ganglia; it is the common sheath for all the nerves within it. The nerves directly enter the stellate pigment-cells. In the anterior portion of the suprachoroid the fibres spread out in a peculiar manner and form discs, which are especially numerous near the ciliary muscle. The two long posterior ciliary arteries have their own nervous apparatus.

e.—OPTIC NERVE AND CENTRAL ORGANS.

61. BECHTEREFF. Experimental investigation of the decussation of the optic-nerve fibres in the chiasm. *Klinischeskaja gazeta*, 1883, Nos. 2 and 3; *Neurol. Centralbl.*

62. LUYS. A l'étude de la physiologie et de la pathologie des couches optiques. *L'Encephale*, vol. ii, 3.

BECHTEREFF'S (61) experiments of dividing an optic tract, or the chiasm in a sagittal plane from in front backward were performed on dogs according to two methods: he either entered with a double-edged knife from the pharynx into the cranial cavity in the region of the sella turcica, cutting either an optic tract or the whole chiasm in a sagittal plane, or he trephined the skull just above the zygomatic arch, between the eye and ear, and then passed along the inner surface of the middle cerebral cavity to the lateral wall of the sella turcica with a curved knife blunt at the tip, and cut the optic tract. The first method is more difficult; in the other the adjacent parts are easily injured.

He obtained the following results: If the optic nerve of one

side is cut, complete blindness of that eye ensues ; the primary reaction of the pupil to light is lost, while the consensual reaction is preserved. When the chiasm is cut in a sagittal plane the animal does not become totally blind in either eye. The primary and secondary reaction to light are both preserved. When an optic tractus is cut neither eye becomes totally blind, and when both eyes are open the animal avoids every obstruction. If one eye, however, is bandaged, it constantly collides with obstructions lying toward the uninjured side. The limitation of the field of vision toward one side can be demonstrated for both eyes (toward the uninjured side). The defect in the visual field seems to be equal to an entire half of each retina. The primary and secondary reactions for light are preserved. The pupils are of equal width. There is therefore semi-decussation in dogs in accord with Gudden's statements. The centripetal fibres which conduct the reaction of the pupils for light, do not pass through the tractus, but enter the brain and then the oculomotor nuclei directly after reaching the chiasm.

HIRSCHMANN.

V.—PHYSIOLOGY.

a.—GENERAL PHYSIOLOGY.

63. AXENFELD. An optical phenomenon which might be utilized in constructing an optometer. *Arch. f. d. ges. Physiol.* vol. xxx.

64. MAUTHNER. The influence of the electric light on the human eye. *Allg. Wien. med. Zeitung*, 1883, No. 10.

65. MATTHIESEN. On the shape of infinitely thin astigmatic pencils of light and Kummer's models. *Sitzungsber. d. math. phys. Classe d. Kön. bayr. Acad. d. Wissensch.*, 1883, No. 1 ; *Klin. Monatsbl. f. Augenhk.*

66. ULRICH. Contribution to the investigations on the interchange of liquids in the eye by means of injections of fluorescin. *Arch. f. Augenheilk.*, vol. xii, 2. These ARCHIVES, this number.

67. URBANTSCHITSCH. The influence of irritation of the trigeminus on the senses, especially sight. *Arch. f. d. ges. Phys.* vol. xxx.

According to MAUTHNER (64) the electric light increases vision and color-perception. The arc-light is not steady, and therefore injurious ; the incandescent light is steady, and theoretically no

objection can be made to it, but experience alone can decide as to its value.

b.—CORNEA, IRIS, AND REFRACTIVE MEDIA.

68. KAZAUROW. The influence of accommodation on the boundary of the visual field. *Wratsch*, 1883, No. 2.

69. MOELI. Remarks on examining the width of the pupil. *Berl. klin. Wochenschr.*, No. 6.

KAZAUROW (68) has found that the field of vision is enlarged by accommodation by an advance of the retina and choroid and the pupillary area, and in an aphakic eye by an advance of the choroid and retina only. The smaller size of the pupil only slightly diminishes this effect.

HIRSCHMANN.

c.—RETINA AND CENTRAL ORGANS.

70. BECHTEREFF. The function of the optic thalami. *Wratsch*, 1883, Nos. 4 and 5; *Neurol. Centralbl.*

71. CHARPENTIER. Expériences relatives à l'influence de l'éclairage sur l'acuité visuelle. *Arch. d'ophth.*, vol. iii, 1.

72. M. LANDESBURG. Is mechanical irritation of the optic nerve always followed by a sensation of light? *Med. Times*, Feb. 24, 1883.

73. PLACIDO. Physiologia do punctum cæcum da retina humana. Porto, 1883, and *Centralbl. f. prakt. Augenheilk.*, p. 121.

74. SAKIEWITSCH. A few cases of extraordinary acuteness of vision. *Wratsch*, 1883, No. 1.

75. STÖBER. Du champ visuel simple ou achromatique et de ses anomalies. *Arch. d'ophth.*, vol. iii, 1-3.

BECHTEREFF (70) concludes from his experiments, which consisted in irritating as well as destroying certain parts of the optic thalami of various animals, both before and after removing the hemispheres, that in higher animals (dog) the destruction of the anterior, middle, or posterior portion of this ganglion affects sight. When the anterior portion is destroyed, the visual disturbance is no longer perceptible after a few days. When the posterior portions are destroyed, however, lasting hemianopsia results, clearly proving semi-decussation. The reports of various authors of the influence of the optic thalami on the reaction of the pupil, forced movements and disturbances of the equilibrium, he ascribes to injuries of the neighboring parts during the experiments. He also

denies that the optic thalami have any influence upon sensibility. Neither has he observed any motor paralysis. The author proves by his experiments that the optic thalami contain the centres of involuntary innervation of those muscles which give expression to the various emotions, varying according to the nature of the animal. These ganglia, therefore, mainly control the so-called expressive utterances and the movements. The corpora quadrigemina, however, which are considered the centres controlling the expression of sensations and feeling by modern authors, have no influence in this respect.

HIRSCHMANN.

CHARPENTIER (71) illustrates by a number of curves the influence of illumination on the acuteness of vision. He fastened two black pasteboard discs, from which sectors had been excised, in such a manner above each other that the sectors more or less covered each other. The discs were then set in rotation before the eye, and the distance measured at which the test-object was recognized. The intensity of illumination could readily be determined from the extent to which the sectors overlapped each other. The author used for these experiments a lamp whose intensity could be regulated, and his differential ophthalmometer described in the *Arch. d'ophth.*, vol. ii, No. 5.

v. MITTELSTÄDT.

LANDESBURG (72) concludes from a number of observations—seventeen in all—that mechanical irritation of the optic nerve causes pain in some cases, but only occasionally a sensation of light.

BURNETT.

According to the investigations of PLACIDO (73), the filling up of the area of the blind spot is a real physiological fact, the cause lying in the retina. The entrance of the optic nerve is surrounded by a peculiar retinal zone, the irritation of which does not produce the sensation of a ring, but of a uniformly illuminated disc. As soon, however, as the objective ring of light is moved in the visual field, it at once assumes the shape of a ring. Probably the surface of the retina in this peripapillary ring has a shape differing from the remainder of the retina; it gradually curves toward the centre of the globe. Taking into consideration the principle of projection, it is found that the normals of this ring fill the whole area in the visual field corresponding to the papilla.

SAKEWITSCH (74) found among the soldiers of the 14th regiment of Russian dragoons two cases with $V = \frac{4}{10}$, three with $V = \frac{3}{10}$, and seventeen with $V = \frac{2}{10}$.

STÖBER (75) has constructed a number of charts for pathological fields of vision, and furnishes the proofs for them from observations by himself and other authors of diseases of the optic nerve, the retina, and choroid, calling attention at the same time to the value of perimetry in etiology and prognosis.

V. MITTELSTÄDT.

d.—COLOR-PERCEPTION.

76. DE CHARDENNET. Vision des radiations ultra-violettes. *Compt. rend. hebdomadaires des séances de l'acad.*, No. 8. The retina is capable of perceiving the ultra-violet rays, but the lens absorbs them.

77. CHARPENTIER. Perception des couleurs à la périphérie de la rétine. *Arch d'ophth.*, vol. iii, 3.

78. CHEVREUL. Memoire sur la vision des couleurs matérielles en mouvement de rotation. *Compt. rend. hebdomadaires des séances de l'acad.*, No. 23.

79. CROCKER. Lessons on color in primary schools. Boston, 1883. Recommends the color-chart of Magnus; edited in English by Jeffries.

80. HIRSCHLER. Erythroptia in aphakic eyes. *Wiener med. Wochenschr.*, 1883, Nos. 4-6.

81. KÖNIG. The neutral point in the spectrum of the color-blind. The point of intersection of the curves representing the intensity of the three primary colors in the normal eye. *Physik. Gesellsch. in Berlin*, March 14, 1883.

82. LAURENT. Du Daltonisme : étiologie, fréquence, danger. Thèse, 1883.

83. LAYET. Du Daltonisme. Nécessité d'une éducation du sens des couleurs chez les écoliers. *Gaz. hebdomadaire des sciences médicales de Bordeaux*, Jan. 7, 1883.

84. MARI. La santonina e la visione dei colori. *Ann. d'ottalm.*, vol. xi, 6.

85. OLE BULL. Chromatoptometric plate. Christiania, 1883.

86. ROSENSTIEHL. De la sensation du blanc et des couleurs complémentaires. *Rev. clin. oculist.*, vol. iv, 1.

87. SCHASLER. The world of colors. A new attempt to explain the origin and nature of the colors, with some practical advice for discovering the laws of harmonious combinations. Collection of popular scientific lectures, published by Virchow and

v. Holtzendorff, Berlin, 1883. No. 409 and 410, first section : the relation of the colors to each other and to the eye. No 415, second section : the law of the harmony of colors and its application to the industrial arts.

88. R. W. SHUFELDT. A case of Daltonism in one eye only. *Med. Rec.*, March 24, 1883.

CHARPENTIER (77) tested the sensibility for colors of the periphery of the retina with Landoldt's perimeter. A minute electric light was the source of illumination, before which colored glasses were successively placed. It was found that in the periphery also colors are perceived when sufficiently intense ; the colored surface need therefore not be large, as the experiments were made with mere points of colored light.

v. MITTELSTÄDT.

As the intensity increases, the neutral point (81) moves in the same person toward the blue end of the spectrum. An examination of ten persons showed that the colors at the neutral point gradually merge into each other.

LAYET (83) demands that the color-sense of children should be trained, and recommends Holmgren's method and the colored plates of Magnus for this purpose.

MARCKWORT.

According to MARI (84) forty centigrammes of the drug are sufficient to produce an effect lasting twelve hours. Bright surfaces appear greenish-yellow ; dark ones, especially shadows, violet. Red assumes a purple tinge, yellow seems pale, blue has a greenish tinge, violet and purple become darker, orange seems pink, greenish-yellow is changed to gray. The spectrum is shortened, especially at the violet end. In a violet-blind person the whole spectrum was displaced.

DANTONE.

OLE BULL (85) has obtained ten shades of the primary colors, red, yellow, green, and blue, by mixing them with gray, whose relative intensity would then be expressed by the numbers 1.15, 2, 4, 6, 8, 11, 14, and 18, 1 representing the palest shade. When this palest shade is recognized at a distance of 1 metre, C (color-perception) of the person tested = $\frac{1}{4}$; but if it were the sixth shade, for instance, $C = \frac{1}{4}$.

SCHASLER (87) puts himself into direct opposition to the present theories of colors in a polemic manner which scarcely can be approved of. The main idea seems to be that obscuration is the cause of the colors. If Schasler thinks that the laws of harmonious colors can be thus explained he is certainly mistaken ; it is just

the physical explanation of color, so energetically opposed by Schasler, which conforms with the greatest accuracy to the laws governing the æsthetic combination of colors and the physiology of the nerves. The principal sentence with which he attempts to overthrow the present theories, is as follows: "The only two objective factors, the product of which is called 'color,' are light and obscurity; *i. e.*, the misty atmosphere of the earth, which modifies the light in various ways and transmits these modifications to the eye, which is organized to perceive them."

SHUFELDT (88) reports as follows: A man of 21 (white-washer), perfectly healthy, who never had received any injury. Right eye emmetropic; left, myopic. With both eyes open he sorts correctly the similar shades of purple and green according to Holmgren's method, but hesitates slightly in picking out the red. With the left eye only open he lays together red, brown, and yellow in shades varying from dark to light ochre-yellow. Green and purple shades are selected correctly with this eye. BURNETT.

B.—ANOMALIES OF REFRACTION AND ACCOMMODATION, LIDS, LACHRYMAL APPARATUS, MUSCLES AND NERVES, ORBIT AND NEIGHBORING CAVITIES, CONJUNCTIVA, CORNEA, SCLERA, AND ANTERIOR CHAMBER.

BY DR. C. HORSTMANN.

I.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

89. BAAS. The increase of myopia. *Med. chir. Centralbl.*, 1883, No 3.

90. CHASANOW, S. The progression of myopia. Inaug. Dissert., Königsberg, 1883.

91. MANZ. The eyes of the school-children of Freiburg. Freiburg and Tübingen, 1883, J. C. B. Mohr.

92. DÜRR. The refraction of 414 scholars after instillation of homatropine. *Graefe's Arch. f. Ophth.*, vol. xxix, 1, p. 103.

93. HANSEN, W. Examination of the eyes of 808 school-children between the ages of 10 and 15. *Klin. Monatsbl. f. Augenheilk.*, vol. xxxi, p. 196.

94. DOBROWOLSKY, M. Vision and myopia of the scholars of the Ural high-school. *Wratsch*, 1883, No. 6.

95. SCHADOW. The eyes of the school-children of Borkum. *Klin. Monatsbl. f. Augenheilk.*, vol xxxi, p. 150.
 96. MITTENDORF, W. J. The influence of civilization on the human eye, especially on the development of myopia. *Verhandl. d. deutschen ges.-wissenschaftl. Ver. in N. Y.*, vol. v, pp. 30-38.
 97. PAULSEN. The development and treatment of myopia. Berlin, 1883, A. Hirschwald.
 98. HUNT, D. The cause of myopia. *N. Y. Med. Journ.*, 1883, No. 10.
 99. MILLINGAN, E. VAN. The ophthalmic hospital at Constantinople. Report for 1880 and 1881.
 100. KÖNIGSHÖFER. The mechanism of hand-writing. *Berlin. klin. Wochenschr.*, 1883, No. 11.
 101. BERLIN, R. and REMBOLD. Investigations on the influence of writing on the eyes and attitude of school-children. Stuttgart, 1883.
 102. BONO. Indice cefalico e refrazione oculare. *Giorn. de R. accad. di med. di Torino*, 1883, No. 1.
 103. NORDENSON, E. Recherches ophthalmométriques sur l'astigmatisme de la cornée chez les écoliers de 7 à 20 ans. *Annal. d' ocul.*, 1883, vol. lxxxix, p. 110.
 104. GIRARD. Astigmatisme mixte de l'œil droit, mixte de l'œil gauche, longstems méconnu, asthénopie, photopsie, et myodésopsie; interprétation et provisions cliniques. *Rev. trim. d' ophth.*, Jan. 5, 1883.
 105. CULBERTSON. A method of determining ametropia with prisms. *Cincinnati. Lancet and Clin.*, Jan. 20, 1883.
 106. JAVAL. Déformations cristallienne et cornéenne dans l'accommodation. *Soc. de biol.*, 1883, 2 mens.
 107. PEREYRA. Spasmo acuto di accomodazione per nevralgia del trigemino. *Boll. d' ocul.*, vol. v, 7, p. 191.
 108. SIMI. Ottalmojatria. Lezione I, II, and III. *Boll d' ocul.*, vol. v, No. 7. Lectures on refraction and accommodation.
 109. HANSELL, H. F. Ophthalmic memoranda. Refraction. *Med. Bull.*, vol. v, 4, p. 76.
 110. BURCHARDT. International test-types. 3d ed. Kassel, 1883. Consists of points and dots.
- BAAS (89) calls attention to the fact that the cause of myopia of

school-children must not be sought in the school alone, but also in the greatly increased length of time devoted to study at home. Unsuitable conditions at home, poor illumination, disproportionate seats, etc., also contribute their share. To prevent the development and increase of myopia, the time devoted to study at home must be diminished, so that the children may have a chance to play in the open air.

MANZ (91) publishes his investigations of the eyes of the school-children of Freiburg, and finds the well-known conditions. In addition to other preventive measures against myopia, he calls attention to the present method of writing; the present slanting system causes a bad attitude of the head, which may partly be prevented by a more perpendicular style. More importance should be attached to clearness than beauty of penmanship.

DÜRR (92) examined the eyes of the scholars of the lyceum and the seminary at Hanover, after previously instilling a five-per-cent. solution of homatropine. He found that in four fifths of all examined a portion of the accommodation was latent, being equal to 1-1.33 D in the great majority. Of 414 examined, 263 were hypermetropic, and 133 myopic, the rest emmetropic. In 94 of the 133 myopes there were no changes in the choroid; in the remaining 39 there was a conus in 14, and sclerectasia posterior in 25. The degree of myopia had increased in the older scholars. There was less myopia among the scholars of the seminary than of the lyceum. The author thinks that this is due to the shorter hours of work in the public schools, of which the former are the continuation, as compared with the lower classes of the high-schools. In younger years the eyes should not be strained severely, in order to preserve them in a more normal condition.

HANSEN (93) examined 808 school-children between the ages of ten and fifteen, 753 of whom were hypermetropic, and 23 myopic. The average degree of hypermetropia at the age of ten was 1.75 D, which decreased to 0.75 D at fourteen.

DOBROWOLSKY (94) calls attention to the fact that most of the scholars of the Ural high-school are children of inhabitants of the prairies, to which must be ascribed their acuteness of vision and the rarity of myopia, and not to favorable hygienic conditions of the schools. The injurious influence of the school manifests itself here also when the lowest and highest classes are compared. Among 212 scholars there were 136 Kossaks,

75 % of whom had $V > 1$, 21 % $V = 1$, 4 % $V < 1$; in 76 other inhabitants, $V > 1$ in 63 %, $V = 1$ in 30 %, and $V < 1$ in 17 %. In the lowest classes, $V > 1$ in 65 %, $V = 1$ in 29 %, and $V < 1$ in 16 %; in the highest classes, $V > 1$ in 40 %, $V = 1$ in 40 %, and $V < 1$ in 20 %. There was 12 % of myopia: in the lower classes, 7 %; in the higher, 40 %. The degree of myopia in 73 % was equal to or less than $\frac{1}{8}$, greater in 27 %.

HIRSCHMANN.

SCHADOW (95) examined the eyes of the school-children of Borkum. He found only one myopic child in 146; of the remainder $\frac{1}{4}$ were emmetropic, the others slightly, a few more highly hypermetropic. $V = \frac{2}{3}$ in 92 %, and was diminished in only 3 %; in the others it was normal.

MITTENDORF (96) explains the views now current in regard to the development of myopia in the schools. He examined the eyes of 2,030 children in the schools of New York, in conjunction with Dr. R. H. Derby, not only with glasses, but also with the ophthalmoscope. He also observed the increase of myopia in the higher classes.

BURNETT.

PAULSEN (97) discusses the various theories of the development of myopia, explains at length his own of distention, and gives advice in regard to the treatment.

HUNT (98) attempts to combat the prevalent views in regard to the hereditary disposition to myopia, and looks at the subject from an embryological point of view. The best idea of the author's meaning can be obtained by referring to his own words, when he says: "It seems natural to assume that the cerebral tissue will impress its form during its growth upon the tissue in which it is contained. This tissue assumes its permanent shape later in form of the bony skull. The cerebral substance constituting the eye also impresses its shape upon the tissue forming the sclera, and it seems natural to conclude that this phenomenon of mutability of the human eye is a collateral one, instead of being a change due to function and heredity, and that the brain is the organ to which the eye is closely related."

BURNETT.

KÖNIGSHÖFER (100) proves that the laws governing the movements of the eyes do not come into action at all, or only slightly so, in writing. The conclusions of Berlin (see *antea*) are, therefore, erroneous. The direction of the writing is entirely immaterial, as far as the laws governing the movements of the eye are concerned. The sole cause of the various bad attitudes of the

body is the attempt to find the most comfortable position of the wrist and fingers.

BONO (102) has determined the cranial index (of course, only the ratio between length and breadth), according to Broca's method, in 250 persons, 78 of whom were myopic, 100 emmetrope, and 72 hypermetropic, and compared it with the refraction. The interesting fact was revealed that the index of the myopes was 80, of the emmetropes 81, and of the hypermetropes 87. In eight pairs of brothers, one of whom was myopic, the other hypermetropic, the index of the former was 74-81; of the latter, 84-88; the mean difference was therefore 8. The author thinks he may conclude from his measurements that the depth of the orbit corresponds to the dolicho- or brachy-cephalous configuration of the skull, and that this determines the dimensions or refraction of the globe respectively.

DANTONE.

NORDENSON (103) examined the eyes of 226 scholars of the École Alsacienne of Paris, with the ophthalmometer of Javal-Schjötz, and reports his results in detail. He concludes from his investigations that the lens generally corrects the corneal astigmatism, acting as a convex-cylindrical glass, whose curvature in its various axes varies in consequence of unequal contraction of the ciliary muscle. In this manner, Nordenson explains the fact that young emmetropes, with a corneal astigmatism of 1.5 D, had $V = 1$, without correcting it; the corresponding glass even diminished their vision. $V > 1$ does not exclude astigmatism, but in cases of asthenopia astigmatism must be sought for as one of the most probable causes.

MARCKWORT.

CULBERTSON (105) determines the degree of ametropia by doubling the image of an object by means of a double prism with the bases together. When an object of definite size is at a certain distance, the images touch at the edges. A departure from this indicates ametropia. Its degree is determined by the glass which when placed before the prism would produce the same image. The method is available for determining the degree of myopia, hypermetropia, and astigmatism.

BURNETT.

PEREYRA (107) observed a visual disturbance in an hysterical lady during an attack of tic douloureux, which proved to be a spasm of accommodation (apparent myopia = $\frac{1}{14}$). After instilling atropine the true refraction was found to be $H = \frac{1}{14}$.

DANTONE.

II.—LIDS AND SURROUNDINGS.

111. STORY, J. B. Operations for trichiasis and entropium. *Ophth. Rev.*, Feb. 1883, vol. ii, 16, p. 37.

112. EVERSUSCH. The operation of congenital blepharoptosis. *Klin. Monatsbl. f. Augenheilk.*, 1883, vol. xxi, p. 100.

113. BOUVIN, M. J. Plastische operaties der vogleden met ongestelde huiltappen. *Weekblad.*, No. 13, 1883.

114. SCELLINGO. Nota clinica intorno alla cura dell' entropion. *Boll. d' ocul.*, vol. v, 7, p. 195.

115. VERON, L. Cautérisation palpébrale chez les granuleux. *Arch. d' ophth.*, vol. iii, 3.

116. FIEUZAL. Entropion cicatriciel; autoplastie. *Soc de chir.*, July 12, 1883.

117. RICHT. Tumeur érectile de la paupière chez un petit enfant. *Rec. d' ophth.*, vol. iii, 1, p. 12.

118. EPÉRON. Sarcome de la région interne de la paupière gauche; exstirpation; autoplastie. *Arch. d' ophth.*, vol. iii, No. 3.

119. THOMSON. Abscess of eyelid of eleven months' standing simulating tumor of orbit. *Med. Times and Gaz.*, No. 1711.

120. MAKROCKI, F. Case of perversely grown subcutaneous lashes. *Centrabl. f. prakt. Augenheilk.*, 1883, p. 129.

STORY (111) reviews the various operations for entropium in trichiasis and recommends the method of Spencer Watson. He forms at each end of the lid both a ciliary and a cover flap. The base of the former is at the middle of the base of the upper lid, of the latter at both ends. He transplants one flap from above, in order to fill the space left by the elevation of the ciliary flap. If sutures according to Anagnostakis are applied besides, in order to fasten the ciliary flap to the tarsus, the lid cannot be turned inward again. In order to prevent the flap from touching the cornea, Dianoux recommends to leave the ciliary flap in connection with the lid at both ends, and to pass the other flap through the button-hole left between it and the tarsus.

In operating for congenital blepharotosis EVERSUSCH (112) applies Snellen's blepharostat in such a manner as to push the plate high up behind the lid. When the screw is turned down, not only the tarsal portion of the upper lid but also its continuation to the fornix and skin of the forehead must be within the instrument. He then cuts through the skin and the orbicularis

muscle in almost the whole breadth of the lid, parallel to its edge and at an equal distance from it and the eyebrow. He then detaches the skin and muscle upward and downward to the extent of 4 mm., so as to expose the upper fornix and the insertion of the levator at the tarsus. A suture is then applied at the exposed insertion of the levator, and the needle passed downward between the orbicularis and the tarsus, so as to reappear in the middle of the edge of the lid. Before tying the threads at the edge of the lid, he unites the wound. The tendon of the levator is thus brought forward and the ptosis diminished.

BOUVIN (113) has successfully transplanted a flap without a pedicle in cases of entropium, and believes that this method combined with a moist bandage with lukewarm boracic acid deserves more attention than it has hitherto received.

SCELLINGO (114) claims to have obtained good results in entropium by forming a scar at the margin of the lid with the thermo-cautery of Pacquelin.

DANTONE.

VERON (115) recommends the thermo-cautery in entropium and trichiasis, with which he makes an incision to the tarsus parallel to the edge of the lid, at a distance of 1 cm. from it. The effect upon the granulations, pannus, and ulcerations is favorable, while the disease itself is also cured. Several cases are reported.

V. MITTELSTÄDT.

FIEUZAL (116) presented a man who was operated when a child for cicatricial ectropium; the flap was taken from the forearm.

MARCKWORT.

RICHET (117) reports a case of erectile tumor of the lid, which he intended to treat with injections of sesquichloride of iron. The concentration of the solution shall be determined by experiments upon the coagulation of the patient's blood with solutions of varying strength.

MARCKWORT.

EPÉRON (118) reports a case of sarcoma observed and operated in Landolt's clinic, which had developed in a woman of thirty-two in the course of six months, and occupied the region of the left lachrymal sac, the bridge of the nose, and the neighboring part of the cheek. It was extirpated, and the large defect covered with a sliding flap. Rapid recovery; no relapse. Cosmetic effect very good. The microscope showed that the tumor had developed in the connective tissue of the muscles; these were partly destroyed by the tumor, which was found to consist of

small round cells with large nuclei. The hyaloid degeneration of the sheaths of the blood-vessels here and there seems to confirm Billroth's theory of the development of cylindromata.

V. MITTELSTÄDT.

MAKROCKI (120) saw several little nodules on the upper lid of both eyes of a lady. After incising the skin over them, several well-formed lashes were easily extracted. A few days later only a fine scar remained in place of the nodule.

III.—LACHRYMAL APPARATUS.

121. DEHENNE. Tumeur lachrymale congénitale. *Soc. franç. d'ophth.*, 1883.

122. DESPRÉS. Rapport sur une observation de M. Parinaud: Fistule lacrymale d'origine dentaire. *France méd.*, Feb., 1883.

123. MAYET. Du traitement doux et rapide du larmolement et de la dacryocystite. *Thèse de Paris*, 1883.

124. FIVRE, CESARE. Dilatatore delle vie lagrimali. *Ann. d'ottalm.*, vol. xii, 1, p. 6.

125. THOMSON. Treatment for suppuration of tear-passage. *Med. Times and Gaz.*, No. 1711.

DEHENNE (121) reports a case of congenital tumor of the lachrymal sac; he opened it like an abscess. TERSON observed two similar cases; PARINAUD one in the child of syphilitic parents. COURSERANT saw a similar affection in both eyes of a patient. GALEZOWSKI has treated several such cases with simple injections of water with good results.

MARCKWORT.

PARINAUD (122) observed a fistula of the lachrymal sac, which he thinks was due to an affection of the root of the canine tooth.

MARCKWORT.

IV.—MUSCLES AND NERVES.

126. GUTTMANN, G. A case of advancement of the inferior rectus muscle, whose insertion had been moved back by an injury. *Centralbl. f. prakt. Augenheilk.*, 1883, p. 36.

127. BURCHARDT. Annual report and observations on the effect of the squint-operation on the vision of the squinting eye. *Berliner Charité Ann.*, vol. viii, p. 592.

128. MORTAIS. De l'emploi des louchettes consécutivement à l'opération du strabisme convergent. *Soc. franç. d'ophth.*, 1883.

GUTTMANN (126) describes the case of a woman of forty-two, in whom an injury had produced strabismus sursum vergens paralyticus and a partial anterior symblepharon of the lower lid. The symblepharon was divided, and the inferior rectus advanced. The strabismus disappeared entirely, and only a slight dynamic divergence remained.

MORTAIS (128) prescribes strabismus spectacles immediately after the operation. According to the degree of divergence desired, the vertical slit must be placed either in the middle of the plate covering the squinting eye, or more to the temporal side. The good eye is kept completely closed.

129. BERGER. Paralyse de l'acoustique et du trijumeau. *Rec. d'ophth.*, vol. iii, 1, p. 25.

130. HUGHLINGS-JACKSON. Movements of the eyes in ear-disease. *The Lancet*, 1883, No. 3.

131. LEES. Paralysis of the third nerve, with cerebral symptoms. *The Lancet*, 1883, No. 3.

132. LEES. Paralysis of the sixth nerve, with choreiform movements of the face. *The Lancet*, 1883, No. 3.

133. BENSON. Paralysis of the ocular muscles after diphtheria. *The Lancet*, 1883, No. 11.

134. V. HASNER. A case of periodic paralysis of the oculomotor nerve. *Wiener med. Wochenschr.*, No. 12; *Prager med. Wochenschr.*, No. 10.

135. PARINAUD. Paralyse des mouvements associés des yeux. *Arch. de neurol.*, 1883, No. 14.

136. DE VINCENTIIS. Contribuzione alle localizzazioni cerebrali. *Revista clinica*, 1883.

137. THOMSON. Spasm of the eyelids and ciliary muscles, with intense pain caused by exposure to electric light. *Med. Times and Gaz.*, No. 1711.

BERGER (129) describes two cases of paralysis of the acoustic and fifth nerves with paresis of the facial nerve, due to caries of the petrous portion of the temporal bone; in one of the patients, the cornea of the affected side had remained intact, though without sensibility; in the other, there was neuroparalytic keratitis.

MARCKWORT.

BENSON (133) observed in a girl of eleven, who had suffered from diphtheria, besides other paralyses, an affection of the ciliary body in the fifth week, which continued for seven weeks ; in the ninth week the levator palpebrarum was paralyzed, and remained so for a week ; at the same time the abducens muscles were paralyzed, which condition continued for three weeks. In the tenth week there were convergence and diplopia for four days. Paralysis of the ciliary muscle is the most common symptom. The lesion must be sought at the centre of accommodation, at the posterior portion of the floor of the third ventricle.

HASNER (134) observed a paralysis of the left oculomotor nerve in a girl of seventeen, which always occurred, for the last four years, as soon as menstruation began, and lasted for three days. Hyperæmia, due to menstruation, at the origin of the left oculomotor nerve, was probably the cause, producing transient paralysis by pressure.

DE VINCENTIIS (136) observed total paralysis of the right external rectus and left internal rectus muscles (conjugate paralytic strabismus), in a tuberculous girl of thirteen, five months before her death. V normal in both eyes ; no diplopia, though the head was constantly kept turned to the right ; there were no other paralyses. The autopsy confirmed the diagnosis of tuberculous infiltration of the origin of the abducens, as a caseous tumor, the size of a pea, was found on the floor of the fourth ventricle in the right corpus candicans. No lesion of the cerebral substance was noticed in the aquæductus Sylvii, where the nuclei of the third pair are found. A histological examination of the paralyzed nerves, unfortunately, could not be made. DANTONE.

THOMSON (137) observed painful blepharospasm, and spasm of the ciliary muscle, after exposure to the electric arc-light.

138. MOUCHET. Nevralgie du trijumeau, tic douloureux. Elongation du nerf dentaire inférieur droit. *Soc. de chir.*, Feb., 1883.

139. NIÇAISE. De la resection du nerf sous-orbitaire dans le tic douloureux ou nevralgie faciale rebelle. *Paris méd.*, Dec., 1882.

140. PÉAN. Traitement chirurgical des nevralgies : section, résection, cautérisation, élongation, arrachements des nerfs. *Gaz. des hôp.*, Jan., 1883.

MOUCHET (138) stretches the dental nerve for neuralgia of the fifth nerve, it being most severe in the region of that branch. The affection was cured, but a slight difficulty in chewing was experienced afterward.

MARCKWORT.

In treating tic douloureux, NIÇAISE (139) institutes a close search for its cause (syphilis, anæmia, carious tooth, etc.), and then tries to remove it. If this treatment fails, division, stretching, or resection of the nerve must be resorted to. In one case, Niçaise performed a very extensive resection of the infra-orbital nerve, after he had opened the upper wall of the bony canal.

MARCKWORT.

In obstinate cases of facial neuralgia, PÉAN (140) destroys the nerve in question to a great extent; he tries to tear out as large a piece of the nerve as possible, and then passes a glowing platinum wire into the bony canal. The supra-orbital nerve, however, should be very carefully stretched.

MARCKWORT.

V.—ORBIT AND NEIGHBORING CAVITIES.

141. NOTTA, MAURICE. Abscès du sinus frontal; guérison. *Rec. d'ophth.*, vol. iv, No. 3, p. 161.

142. PEARSON. Necrosis of roof of orbit. *The Lancet*, 1883, No. 11.

143. THOMSON. Gunshot accident, causing fracture of bone and chorio-retinitis. Bullet lodged in orbit. *Med. Times and Gaz.*, No. 1711.

144. DE LA PEÑA. Echinococcus orbitæ. *Rec. d'ophth.*, vol. iv, No. 2.

145. BARABASCHOW, N. A second case of echinococcus of the orbit. *Wratsch*, 1883, No. 1.

146. PANAS. De l'inflammation de la bourse celluleuse retro-oculaire ou ténonite. *Arch. f. ophth.*, vol. iii, No. 3.

147. PANAS. À propos de deux nouvelles observations d'angiomes caverneux de l'orbite. *Arch. d'ophth.*, vol. iii, No. 1, p. 1.

148. GAYET. Tumeur pulsatile de l'orbite suivie de guérison. *Ann. d'ocul.*, 1883, vol. lxxxix, p. 35.

149. GUSSENBAUER. Extirpation of a cavernous angioma of the orbit with preservation of the globe. *Wiener med. Wochenschr.*, 1883, No. 9.

150. FROST, W. A. Pulsating exophthalmus. *Ophth. Soc. of the Unit. Kingd.*, March 3, 1883. *The Lancet*, No. 11.

151. EALES. Exophthalmus and optic neuritis. *The Lancet*, 1883, No. 11.

152. PEPPER. A clinical lecture on exophthalmic goitre. *N. Y. Med. Journ.*, 1883, No. 6.

153. FITZGERALD, W. A. The theory of a central lesion in exophthalmic goitre. *Dublin Journ. of Med. Sci.*, March 1883, p. 201.

154. BALLET. De quelques troubles dépendant du système nerveux central observés chez les malades atteints de goître exophthalmique. *Rev. de méd.*, 1883, No. 4.

NOTTA (141) reports a case of abscess of the frontal sinus, which had developed into a tumor the size of a pigeon-egg at the inner portion of the margin of the left orbit, after a part of the lower wall of the sinus had been absorbed; it disappeared on pressure, while offensive greenish pus was discharged from the left nostril. The abscess was opened, the inner wall of the frontal sinus scraped, drainage-tubes inserted for two days, and the cavity syringed out with carbolic acid; and in three weeks it was cured (*cf. König. spec. Chir.*, vol. i, p. 232).

MARCKWORT.

PEARSON (142) reports the case of a young girl of ten, who was suffering from a stiff neck. Soon after the right upper lid began to swell, but improved again. Later a relapse with delirium set in, resulting in death on the 10th day. The autopsy showed that the right orbital plate was inflamed and discolored and partly destroyed; the dura mater above the petrous portion of the right temporal bone was covered with a yellow exudation, while the right temporal lobe of the brain, the right optic nerve, and the surrounding tissue were infiltrated.

DE LA PEÑA (144) found an echinococcus behind a highly diseased and blind eye which he had enucleated. Once before, he had observed a very similar case. According to him the echinococcus in the orbit passes through three stages of development, presenting the following symptoms: (1) Slight exophthalmus, with Vn and Tn, slight and transient pain; (2) increased exophthalmus, decrease of V, high T; (3) marked exophthalmus, dislocation of the globe outward, complete loss of V, suppuration of the cornea.

MARCKWORT.

P. BARABASCHEW (145) reports the following case: patient twenty-seven years old, formerly soldier, marked exophthalmus of the right eye, chemosis, partial xerosis of the cornea, $V = 0$, choked disc; the orbit filled with a smooth, tense tumor, distinctly fluctuating, and dislocating the globe downward and outward. In 1877, while he was a soldier, a shell exploded near him and he became unconscious. After half an hour he recovered, when he noticed that vision in the right eye was greatly impaired. Two months later the eye gradually began to swell. Diagnosis by exclusion: echinococcus of the orbit. When punctured $7\frac{1}{2}$ 3 of colorless liquid were discharged (traces of albumen, much NaCl, doubtful reaction for succinic acid, no phosphates). After the puncture severe reaction, œdema extending to the temple and lasting several days. Operated by making an incision at the upper inner edge of the orbit, preserving the globe. Fifteen larger and smaller echinococci were removed, varying in size to that of a pigeon-egg, and finally the original cyst. After the operation severe reaction and slow recovery (as also in another case described a short time ago by the same author).

HIRSCHMANN.

PANAS (146) discusses the symptoms, course, and treatment of inflammation of Tenon's capsule and reports three cases in which it had developed after a cold in persons suffering from arthritis, and had been successfully treated with salicylate of soda, warm applications, compressive bandage, and scarification of the chemotic folds of the conjunctiva. Three principal symptoms were observed in every case: pain, serous chemosis, and difficulty in moving the eye. In one case, swelling and pulsation of the retinal veins, which afterward disappeared. Pupil normal.

V. MITTELSTÄDT.

PANAS (147) removed a cavernous angioma of the right orbit in a woman of twenty-three. Exophthalmus began to develop when she was eleven years old, after a simple angioma at the angle of the lids had apparently been cauterized several times. The eye afterward became inflamed and then atrophic. When the tumor was removed it was necessary to detach the muscles from it, but not a trace of the atrophic globe could be found. The tumor, which was thought to be a cavernous fibroma, was 6 cm. long, 4.5 cm. thick, and resembled a potato. Poncet thought that the pigment found in considerable quantities in the intercavernous connective tissue was derived from the choroid, but proved to be metamor-

phosed blood. Three months later symptoms of sympathetic ophthalmia were observed in the left eye, which disappeared when a small tumor, sensitive to pressure and situated at the inner lower side of the orbit, was removed, which proved to be the totally atrophic globe. A second case was that of a boy ten years old, from whose left orbit a cavernoma had been removed with the eye by some other surgeon. A small angioma of the eyebrow had escaped observation at the time and was removed by Panas, after it had grown considerably.

V. MITTELSTÄDT.

GAYET (148) describes a case of pulsating orbital tumor, the precise diagnosis of which he leaves in doubt. The auscultation of the tumor underwent interesting changes. Eight days after the injury which was supposed to be the cause, an intermittent blowing noise was heard behind the eye, and soon afterward the same noise increased during the systole; it was so loud that it could be heard when the whole head and neck down to the fifth cervical vertebra was auscultated. Suddenly marked protrusion of the globe developed, pulsation ceased, and the blowing noise decreased. This condition was succeeded by another very different one: continuous blowing sound, increased during systole, noises, and pulsation. One day all the symptoms disappeared and the eye recovered completely.

MARCKWORT.

GUSSENBAUER (149) removed a cavernous tumor of the left orbit in a woman of thirty-three, preserving the globe. It was due to an injury and had caused exophthalmus. The eye again moved freely, and vision improved which had been impaired by neuritis.

FROST (150) observed a case of double pulsating exophthalmus, which had developed in a man of thirty-eight, after an injury received eighteen years ago. Probably the middle cerebral fossa had been fractured. The left carotid was probably injured and communication had been established between it and the sinus. Dilatation of the orbital veins resulted, which condition was transmitted to the veins of the other side through the transverse sinus.

VI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

155. GALEZOWSKI-DAGUENET. *Maladie de la conjonctive. Diagnostic et traitement des affections oculaires.* Paris, 1883.

156. PFLÜGER. *The ophthalmic clinic of Berne University. Report for 1881.* Berne, 1883, p. 16.

157. SIMPSON, R. A. The prophylaxis of ophthalmia neonatorum. *Edinburgh Med. Journ.*, vol. cccxxxiv, April, 1883. *Arch. f. Gynäk.*, vol. xxi, 2.
158. CREDE, C. The prevention of ophthalmia neonatorum.
159. LANDESBURG. Iodoform in ophthalmology. *Centrabl. f. prakt. Augenheilk.*, 1883, p. 6; *Med. Bull.*, vol. v, 3, p. 57.
160. KEYSER, P. D. Iodoform in gonorrhœal ophthalmia. *College and Clinical Rec.*, vol. iii, No. 12, Dec. 18, 1882.
161. FIALKOWSKY, J. A few words on iodoform in ophthalmology. *Medicinsky Westnik.*, Nos. 8 and 9.
162. RICHEL, P. L'iodoform dans la blennorrhœa oculaire. *Thèse de Lille*, Nov., 1882.
163. HARTRIDGE. Boroglyceride in the treatment of purulent ophthalmia. *The Lancet*, No. 3.
164. PECHIN, A. Traitement de la conjonctivite purulente grave. *Thèse de Paris*, 1883.
165. LEWIN. Boracic acid and its application in modern medicine. Inaug. diss., Bonn, 1883.
166. DARTIGOLLES et ARMAIGNAC. Observation de conjonctivite pseudo-membraneuse chez un enfant de huit mois. *Rev. clin. d'ocul.*, vol. iv, Nos. 3 and 4.
167. FERRIN. Ophthalmie purulente. *Progr. méd.*, vol. xi, No. 19.
168. UNTERHARNSCHEIDT, V. The treatment of trachoma. *Klin. Monatsbl. f. Augenheilk.*, vol. xxi, p. 53.
169. JUST. The galvano-caustic treatment of trachoma. *Klin. Monatsbl. f. Augenheilk.*, vol. xxi, p. 162.
170. FERRIER. Inoculation purulente dans le traitement des granulations de la conjonctive et de la cornée. *Rev. de chir.*, vol. iii, No. 2.
171. BAUDRY. Fragments d'ophtalmologie pratique. Paris, 1883, Bertier.
172. PARIZOT. Des formes atténuées de l'ophtalmie blennorrhagique. *Lyon méd.*, 1882.
173. DE WECKER, L. Jequirity ophthalmia. *Klin. Monatsbl. f. Augenheilk.*, vol. xxi, p. 1.
174. DE WECKER and MOURA-BRAZIL. On the use of jequirity in eye-diseases. *London Med. Rec.*, 1883, No. 94.

175. DE WECKER. Quelques indications sur l'emploi du jequirity. *Ann. d' ocul.*, vol. lxxxix, p. 100.
 176. WARLOMONT. Jequirity. *Ann. d' ocul.*, vol. lxxxix, p. 97.
 177. DENEFFE. L'ophthalmie granuleuse et le jequirity. *Ann. d' ocul.*, vol. lxxxix, p. 104.
 178. GRUENING. Jequirity in the treatment of inveterate pannus. *Med. Rec.*, Mar. 17, 1883.
 179. MAZZA. Jequirity. *Ann. di ottalm.*, vol. xi, p. 506.
 180. PAGGI. Jequirity. *Boll. d' ocul.*, vol. v, p. 203.
 181. MOYNE. Jequirity. *Boll. d' ocul.*, vol. v, p. 6.
 182. PONTI. Jequirity. Lettera contributo al Dr. Moyne. *Boll. d' ocul.*, vol v, p. 7.
 183. SIMI. Jequirity. *Boll. d' ocul.*, vol. v, p. 5.
 184. ZWINGMANN, L. Diffuse diphtheritic conjunctivitis of both eyes causing death by acute swelling of the cervical lymphatic glands in a child five months old suffering from eczema of the face. *St. Petersburg. med. Wochenschr.*, 1883, No. 5.
 185. LORING. Case of osteoma of the conjunctiva. *N. Y. Med. Jour.*, Jan., 1883.
 186. VASSAUX, M. G. Sur quatre cas de dermoide de l'œil. *Arch. d' ophth.*, vol. iii, 1, p. 16, 1883.
 187. FALCHI, E. Granuloma e tubercolosi della conjunctiva. *Ann. d' ottalm.*, vol. xii, 1, p. 36.
 188. HESSELING. On tuberculosis of the conjunctiva. Inaug. Diss., Bonn, 1883.
 189. KUSCHBERT and NEISSER. The pathology and etiology of epithelial xerosis of the conjunctiva and idiopathic hemeralopia. *Breslauer ärztl. Zeitschr.*, 1883, No. 4.
 190. CHIARI, H. Congenital ankyloblepharon and symblepharon and congenital atresia laryngis in a child with several other anomalies of formation. *Zeitschr. f. Heilk.*, vol. iv., p. 143.
 191. NOYES. Transplantation of conjunctiva from the rabbit. Alloplasty. *N. Y. Med. Rec.*, March 3, 1883.
- GALEZOWSKI and DAGUENET (155) subdivide conjunctivitis into catarrhal, purulent, diphtheritic, granular, and phlyctenular conjunctivitis. In treating acute catarrhal conjunctivitis, cold applications should be avoided, though they are sometimes moment-

arily pleasant ; on the contrary, the eyes should be bathed several times a day with hot water. Besides the ordinary methods of treatment, they recommend the application of six leeches to the temple and instillation of atropine. The sensation of a foreign body sometimes felt is frequently due to delicate, half-detached shreds of conjunctiva, and can best be allayed by applying vaseline. In the beginning of purulent conjunctivitis, and while the conjunctiva is but slightly injected, the caruncle and semilunar fold are most inflamed, being most exposed to infection. Purulent conjunctivitis must not be treated with lapis infernalis, but with the mitigated stick. This must be applied as soon as possible, and twice daily, both in adults and children, less often (every 2-3 days) when the discharge decreases. Complicating corneal affections are not due to the cauterizations and cold applications, as they remove the causes of affections of the cornea. Antiseptics are also useful in treating purulent conjunctivitis, as the eye is sprayed 4-5 times daily with a 1 % solution of carbolic acid for 4-5 minutes. In blennorrhœa neonatorum they do not use the mitigated stick, but a $2\frac{1}{2}$ % solution of nitrate of silver twice daily.

"Ophthalmie purulente des enfants scrofuleux ou ophthalmie croupale." This disease is peculiar to early childhood (2-6 years), and nothing else than catarrhal conjunctivitis or phlyctenular kerato-conjunctivitis, which in scrofulous children and under poor hygienic conditions gradually develops the symptoms of a genuine purulent, croupous conjunctivitis. The best remedies are iodoform or oleum cadini in form of a salve. In xerosis of the conjunctiva transplantation should be tried, although the chances are slight when the disease has reached an advanced stage.

MARCKWORT.

PFLÜGER (156) believes that every disinfectant, which though only temporarily irritates the conjunctiva, causing increased discharge, creates more favorable conditions for the development of secondary affections. For this reason he is opposed to Crédé's method for the prevention of blennorrhœa neonatorum, the instillation of a 2 % solution of nitrate of silver.

CRÉDÉ (158) believes that only the specific virus of gonorrhœa can produce the blennorrhœa of the new-born. The catarrhal secretion of the genital organs, so frequently met with, cannot produce a specific infection of the eyes, but only a catarrh. Protraction of the final stage of delivery, premature rupture of

the sac, finally the birth of large children, favor infection. In order to prevent the development of the disease, Credé instilled a 2 % solution of nitrate of silver into the eyes of every child, and then applied rags dipped in a solution of salicylic acid, in order to diminish any swelling or redness which might set in. Later, this part of the treatment was discontinued. The percentage of blennorrhœa was thus reduced from 10 % to 0.2 %.

LANDESBURG (159) believes iodoform to be absolutely injurious in blennorrhœic and catarrhal conjunctivitis, and useless in granular conjunctivitis and dacryocysto-blennorrhœa.

According to FIALKOWSKY (161) iodoform is injurious and absolutely contra-indicated in blennorrhœa ; useless in all conjunctival affections, but efficient in the various diseases of the cornea (in serpent ulcer), lids, and operations on the latter. In order to pulverize it more thoroughly, when intended for use as a salve, Fialkowsky advises to add a few drops of ether.

HIRSCHMANN.

RICHEZ (162) discusses the various forms of purulent and blennorrhœic conjunctivitis, and recommends iodoform-salve in treating the latter.

MARCKWORT.

In protracted cases of trachoma, UNTERHARNSCHIEDT (168) removes the granules with the galvano-cautery. Solutions of nitrate of silver may be used between the cauterizations.

JUST (169) objects to this method.

BAUDRY (171) discusses blepharitis, conjunctivitis, and pannus, and the treatment of the last-named affection with jequirity.

MARCKWORT.

PARIZOT (172) recommends inoculation against pannus, and bases his claims on five cases which he cites. The pus should, however, be taken at the chronic stage of blennorrhœa, as the affection produced is then less severe.

MARCKWORT.

WECKER (173, 174, 175) has made a series of experiments with the infusion of jequirity recommended by him for producing purulent ophthalmia to cure trachoma, and has arrived at the following results : Undoubtedly the infusion produces a purulent inflammation of a croupous character, the intensity of which can be regulated by the number of applications. The granulations rapidly disappear, and even if it should be necessary to produce this inflammation several times, the treatment is less disagreeable and dangerous than inoculation. The cornea is not endangered.

H.

After some general remarks on jequirity, and the controversy between de Wecker and Moura-Brazil as to whom may be ascribed the priority of its introduction, WARLOMONT (176) publishes a letter addressed to him by de Wecker, on "Quelques indications sur l'emploi du jequirity." It is indicated in the torpid form of granular conjunctivitis-trachoma. He then publishes a stenographic report of the meeting of the Académie de Médecine de Belgique, on March 31st, in opposition to De Wecker's conclusions.

DENEFFE (177) reported at this meeting on his experiments with jequirity, and comes to the conclusion "the inflammation produced by it fails to accomplish any therapeutical results." Warlomont does not declare himself either in favor of Wecker's or Deneffe's view.

MARCKWORT.

GRÜNING (178) reports two cases in which he used jequirity with excellent results. One was a girl of nineteen; the other, a man of fifty-three. The infusion was applied three times daily, to the conjunctiva, with a fine camel's-hair brush, while compresses saturated with it were applied to the lids day and night. The first change in the conjunctiva was observed twenty-four hours after the first application. After the fifth day its use was discontinued. After two weeks the patients were discharged.

BURNETT.

MAZZA (179) applied jequirity in thirty cases of trachoma. Excellent results were obtained in five severe cases, in which the disease had lasted four years, and there was extensive pannus; the corneæ became perfectly clear. In five other cases improvement was not so marked, while in fifteen others no changes whatever took place; in the remaining five cases the result was absolutely negative, no inflammation whatever developing. He never saw it make a case worse.

DANTONE.

PAGGI (180) succeeded with jequirity in one case of trachoma, but failed in a second.

DANTONE.

PONTI (182) also applied jequirity in four severe cases of trachoma and pannus. The results were excellent, especially as regards the clearing of the corneæ. Besides the usual symptoms he observed in two cases considerable salivation, and in one profuse perspiration and nausea at the height of the inflammation.

DANTONE.

SIMI (183) obtained an excellent result with jequirity in a case

of mixed trachoma. The disease had lasted two years and had not yielded to various methods of treatment by several physicians. Total pannus of the right cornea, the left traversed by several blood-vessels. The applications and compresses were continued for eight days, until headache and slight fever set in. In the second week a 3-per-cent solution of nitrate of silver was applied on two successive days, whereupon the inflammation subsided and the trachoma and pannus disappeared. DANTONE.

LORING (185) observed an osteoma of the conjunctiva in a healthy and well-developed child of eight months. A narrow fold of skin was observed soon after birth at the upper outer angle, which in the course of five months assumed its present shape. No pain, no redness. The tumor was firmly united with the conjunctiva above and at the sides, but not with the globe. The tumor was removed and weighed. It weighed 25 milligrammes, was 8 mm. long, 5.5 mm. broad, and 2.5 mm. high. The longer diameter corresponded to the horizontal meridian of the eye. Dr. Welsh examined the tumor and found that it was surrounded by a thin fibrous capsule, and had a bony structure. BURNETT.

VASSAUX (186) describes four cases of dermoid tumors of the globe, three of them in boys between the ages of fourteen and fifteen, and the fourth in a young woman of twenty. In three the tumor was congenital, had grown latterly, probably through the stimulus of puberty, and had caused annoyance mainly by the growth of small hairs and lashes. The tumors were removed, recovery was rapid, and no relapses occurred. Microscopic appearance: typical structure of the skin, but no sudorific glands, which were found in only one case. The fourth case is remarkable for the fact that besides the congenital dermoid tumor the right half of the face was not symmetrical, and the mouth and ear were misshapen. This concurrence, observed also by others, seems to indicate the development of dermoid tumors during the embryonic period, which the author explains by an "invagination of the lids at some point upon the conjunctiva," which in turn would be due to a temporary union between the amnion and primary ocular vesicle at that spot. V. MITTELSTÄDT.

HESSELING (188) publishes another case of tuberculosis of the conjunctiva, after compiling the sixteen cases thus far described.

KUSCHBERT and NEISSER (189) observed an epidemic of

epithelial xerosis of the conjunctiva and idiopathic hemeralopia in the Breslau Orphan Asylum. Among eighty children twenty-five were affected, and without exception with both symptoms. The disease began in spring and disappeared in autumn. White foamy deposits of various sizes were found upon the conjunctiva within the limit of the palpebral fissure, and always either at the outer or inner corneal margin. They consisted of a fatty substance interspersed with a few epithelial cells, in which large masses of bacilli were embedded, well-marked by their shape and arrangement. The cornea was not affected.

Since 1878, NOYES (191) has transplanted pieces of conjunctiva of the rabbit in six cases; the cases, however, are not described in detail. He prefers black to white rabbits, the conjunctiva of the former being firmer. His method of operating differs from that of Wolfe, inasmuch as he does not transplant the conjunctiva directly upon the eye, but spreads it out upon a cork under water, so that he can manipulate it with greater ease. BURNETT.

192. GALEZOWSKI-DAGUENET. *Maladies de la cornée. Diagnostique et traitement des affections oculaires.* Paris, 1883.

193. PROUFF, J. M. De la kératite en bandelette et son traitement. *Rev. clin. d' ocul.*, 1883, p. 181.

194. MAGNUS, H. On ribbon-shaped keratitis. *Klin. Monatsbl. f. Augenheilk.*, vol. xxi, p. 45.

195. GUAITA. Des ulcères profonds de la cornée et leur traitement antiseptique. *Rec. d' ophth.*, vol. iii, 1, p. 44; 2, p. 90; 3, p. 160; 4, p. 224. *Ann. d' ottalm.*, vol. xi, p. 484.

196. AXEL HOLMER. Om ulcus cornæ serpens. Copenhagen, 1883.

197. LUDWIG. The use of the actual cautery for serpent ulcer. Inaug. Diss., Erlangen, 1883.

198. SNELL, S. The actual cautery in the treatment of corneal ulceration. *Brit. Med. Journ.*, Jan. 6, 1883.

199. VÉRON, L. Opération de Sæmisch (cautérisation palpebrale chez les granuleux). *Arch. d' ophth.*, vol. iii, No. 3.

200. DENARIÉ. Sur un cas de kératite syphilitique. *Lyon med.*, Dec. 3, 1883.

201. GIRARD. Les grandes kératotomies. *Rev. trimestrielle d' ophth.*, Jan., 1883.

202. CARBONÉ, E. De l'iridectomie dans la kératite parenchymateuse et dans la scléro-kératite. *Thèse de Paris*, 1882.

203. GALLENGA. Della doppia iridectomia nella cura dello stafiloma parziale della cornea. *Giorn. d. R. Acca. di med. di Torino*, 1883, No. 1.

204. LINK. Severe case of scrofula with a corneal abscess in both eyes. *Prager med. Wochenschr.*, No. 15.

205. KAHLER. On neuro-paralytic keratitis. *Prager med. Wochenschr.*, 1883, No. 8.

206. JAKUSIEL. Case of diffuse interstitial encephalitis with consecutive ulcerous keratitis in both eyes. *Berliner klin. Wochenschr.*, 1883, No. 7.

207. SCHINDELKA. Two cases of dermoid tumor of the cornea. *Österreich. Vierteljahrsschr. f. wissenschaftl. Veterinärkunde*, vol. lviii, No. 2.

In discussing the treatment of corneal affections GALEZOWSKI and DAGUENET (192) frequently recommend douches with Lourenço's atomizer instead of warm applications. When the symptoms of irritation are very pronounced leeches are applied, even in children. In ulcers of the cornea atropine and eserine are sometimes instilled alternately, eserine alone only when there is danger of a perforation. Herpes of the cornea is treated most effectively with methodical compression, or with a compressive bandage. Better results are obtained in serpent ulcer with keratotomy than with cauterization. In speaking of granular keratitis they recommend the excision of the upper fornix in obstinate forms of granular conjunctivitis. As soon as interstitial keratitis becomes complicated with iritis, iridectomy should be performed.

MARCKWORT.

In order to prevent relapses in ribbon-shaped keratitis PROUFF (193) has frequently excised a flap from the neighboring conjunctiva with good results.

MARCKWORT.

MAGNUS (194) found a ribbon-shaped opacity in fourteen among seventy-five cases of persons more or less severely affected with ocular lesions; all the patients were still young. This opacity was not directly due to impaired nutrition followed by an affection of the whole eye, but it made the development of the opacity possible. Its actual development is due to the external influences to which the cornea is exposed. At first opacities, combined with a loss of corneal substance in the palpebral fissure, develop; later, calcareous deposits are formed. The band-shaped opacity of the cornea is a specific affection of eyes totally or

partially blind from constitutional diseases. For these reasons, therefore, it would seem advisable to substitute the name of "keratitis trophica" for band-shaped opacity of the cornea.

GUAITA (195) discusses corneal ulcers in a longer article, and especially their treatment. He treats them all strictly antiseptically. Boracic acid is added to the solutions of atropine and eserine, which are used in form of a salve, so that their action may last longer, though they are only used once a day (eserin. sulf. 0.07 or 0.1, acid. bor. 0.5, vasel. angl. 10.0). While the eye is being examined or the salve applied the eye is kept under a spray of boracic acid (6 %, temp. 40° C), and then bandaged with salicylated cotton.

Guaita has discarded the use of carbolic acid and thymol, as they irritate the eye too much; he recommends salicylic acid for bandaging, but it cannot be used in form of a spray, as it irritates the respiratory organs. Boracic acid may be used both for washing and bandaging.

MARCKWORT.

AXEL HOLMER (196) closely defines the meaning of the term "corneal ulcer" as described by Saemisch. He considers the micro-organisms found in the secretion produced by dacryocysto-blennorrhœa the most common cause. He then discusses the former attempts at inoculation of rabbits' eyes with blennorrhœic secretion, and adds a few experiments made by himself. His results were almost always positive. He also inoculated eyes with blennorrhœic secretion which had been for five minutes in a two-per-cent solution of nitrate of silver, and always obtained negative results. At Dr. Edm. Hansen's clinic at Copenhagen the serpent ulcer is treated with a two-per-cent solution of nitrate of silver, a method which the author recommends, as it is supported by his experiments; in some cases the ulcer is first scraped out. If the affection is far advanced, he recommends the operation of Saemisch, and thinks that the actual cautery is only applicable to small ulcers. In regard to the development of hypopyon, he accepts the hypothesis of Horner.

SCHJÖTZ.

SNELL (198) cauterizes corneal ulcers with a glowing squint-hook, whose point is covered with platinum. He succeeded in curing them by several superficial applications.

VÉRON (199) publishes the clinical history of several cases, showing the good results obtained by Saemisch's operation in severe cases of corneal abscess due to trachoma.

V. MITTELSTÄDT.

DENARIÉ (200) saw a patient with parenchymatous keratitis die of cerebral gummata. Infiltrations were found in the cornea, which Gayet declared to be gummous. MARCKWORT.

When parenchymatous keratitis and sclero-keratitis become complicated with iritis and local and general treatment have failed, CARBONÉ (202) advises iridectomy. MARCKWORT.

GALLENGA (203) reports that for many years iridectomy has been performed at the healthy corneal margin, at both sides of the scar, in cases of corneal staphylomas, in order to flatten them and diminish the irritation they produce. The result is the more certain, the more it is possible to detach the agglutinated iris and obtain an extensive free pupillary margin. The staphyloma becomes a smooth, solid leucoma, and the pericorneal injection entirely disappears. The two iridectomies must not be done at the same time, but with an interval of two to three weeks between them. In 54 cases operated in this manner, the great majority proved entirely satisfactory. DANTONE.

LINK (204) observed abscesses of the cornea in a scrofulous girl, besides others on the head and genital organs. They took a favorable course. The corneal abscesses healed, leaving only small central sores.

208. GALEZOWSKI-DAGUENET. *Maladies de la sclérotique. Diagnostic et traitement des affections oculaires.* Paris, 1883.

209. BETTMAN BOERNE. The operative treatment of episcleritis. *Weekly Med. Rev.*, March 17, 1883.

GALEZOWSKI and DAGUENET (208) instil atropine and eserine alternately in episcleritis also, as in abscesses of the cornea; a drop of eserine being given in the morning, and a drop of atropine in the evening. MARCKWORT.

The third section of the report will be published in the next number.

Dr. OLE BULL sends us the following communication :

Prof. PREYER having announced my chromatoptric chart in No. 19 of the *Deutsche Literaturzeitung*, I wish to add, with the consent of the editors, a few explanatory remarks.

Prof. Preyer says : "We have no guaranty that all the charts are alike, and the comparison of the results obtained with two

different charts is made illusory even by the varying intensity of daylight."

I must protest against this assertion. As explained in the text, the same pigments have been used for all the charts, inasmuch as all the squares have been cut from twice repainted plates.

It is true that some squares are lustrous, but this can easily be avoided by so placing the chart that the reflection disappears.

The majority of oculists, however, would hardly concur with Prof. Preyer in his assertion that pigments are not suitable for quantitative determinations.

MISCELLANEOUS NOTES.

Book Notices.

1. OTTO BECKER. **Zur Anatomie der gesunden u. kranken Linse.** (On the Anatomy of the Healthy and Diseased Lens.) Wiesbaden: I. F. Bergmann, 1883. Price mk. 36 (\$9).

This quarto volume of 110 double-column pages, with sixty-six superbly executed drawings on fourteen lithographic plates, adds to ophthalmological literature a fundamental work on a subject which, though of the greatest importance, has hitherto been investigated with but very unsatisfactory results. While the treatment of cataract has for many years received the unswerving attention of all ophthalmic surgeons, and the operations for cataract are the pride of our art, the pathology of cataract, until recently, was almost a blank. O. Becker's present work, a supplement of his "Pathology and Therapeutics of the Crystalline Lens" in Graefe-Saemisch's Handbuch, will be studied by every ophthalmic surgeon, from the beginner to the most erudite and experienced practitioner, with delight and profit. The first chapter gives a clear, detailed description of the methods of anatomically investigating cataracts, and will be welcome to every operator who desires to verify and correct his diagnosis after each extraction, and to derive from a sure basis rules for guidance in future operations. The other chapters contain, in systematic arrangement, descriptions of the development, growth, and involution of the healthy lens; the morbid conditions found in the different parts of the crystalline body; its nutrition in the physiological and pathological states; and the general pathology and pathogenesis of cataract. The last chapter, almost half of the text, contains a detailed classi-

fication and description of all known forms of cataract, illustrated by numerous cases from the author's experience, and accompanied by many practical rules and suggestions. The older, but especially the newest, literature on the pathology of the lens, is fully, clearly, and critically discussed. At the end of the context are a bibliography and a description of the drawings. The drawings are, however, constantly referred to in the systematic part.

Authors of works like this not only advance science, but do a service to every practitioner by rendering his daily labor more gratifying and fruitful. Becker's treatise and atlas may be pointed out as a model for imitation, both to the experienced surgeon who is in full practice, and to the student who, at his hand, is introduced into the field of science. Becker, from his hospital and by his influence, procured the material of investigation, and directed the assistants of his clinic, Drs. J. R. Da Gama Pinto and H. Schäfer, how to work it up microscopically. The great majority of the microscopic specimens were prepared by these young men, and the drawings were made by special artists; the text, however, is written by the professor. Every one who knows how much time is consumed by the modern microscopic technique, will appreciate what a gain there is in such a division of labor. To American and English students of ophthalmology Becker's work may be specially recommended, as it not only gives them indispensable knowledge on a most important subject, but the author's clear and correct style will be very useful to them in learning German. The book cannot fail to stimulate and encourage original investigation. It furnishes an extensive and solid foundation for further research, but the author is too modest in saying: What I offer is only a beginning.

2. E. LANDOLT: **Réfraction et Accommodation**, with one hundred and ten figures in the text. This treatise of three hundred and twenty pages, to which about one hundred will be added to complete it, is the first part of the third volume of the *Traité complet d'ophtalmologie*, par L. de Wecker and E. Landolt, the French revised edition of Graefe-Saemisch's *Handbuch*. The German original of this division is rather incomplete; Dr. Landolt's treatise is for the most part independent of the German, and may be considered original. The subject is clearly and exhaustively treated, and the work can be highly recommended to the student and practitioner of ophthalmology. The well-known name of the author is a guarantee of its excellence.

Appointments.

Prof. STELLWAG VON CARION has been appointed to the Chair of Ophthalmology in the University of Vienna, in place of Prof. v. Arlt, resigned.

Dr. EDW. V. JAEGER, Professor Extraordinary, has been appointed Professor in Ordinary of Ophthalmology, at the same university.

Dr. J. A. ANDREWS, formerly Assistant Surgeon to the Manhattan Eye and Ear Hospital, has been appointed Attending Ophthalmic Surgeon to Charity Hospital, New York, instead of Dr. E. P. Ely, resigned.

(The Ophthalmic Division in Charity Hospital consists of a male and a female ward of thirty-two (free) beds each, with two small rooms for operative cases. There is no Dispensary connected with it. The annual number of inmates is nearly 500, of operations about 150. The published report of 1881 shows 14 iridec-tomies, 18 extractions, 12 enucleations, 39 operations on the lids, etc. The present staff consists of Drs. E. S. Peck, Richard Kalish, and J. A. Andrews, as Visiting Surgeons, and a number of internes. The service is not continuous.)

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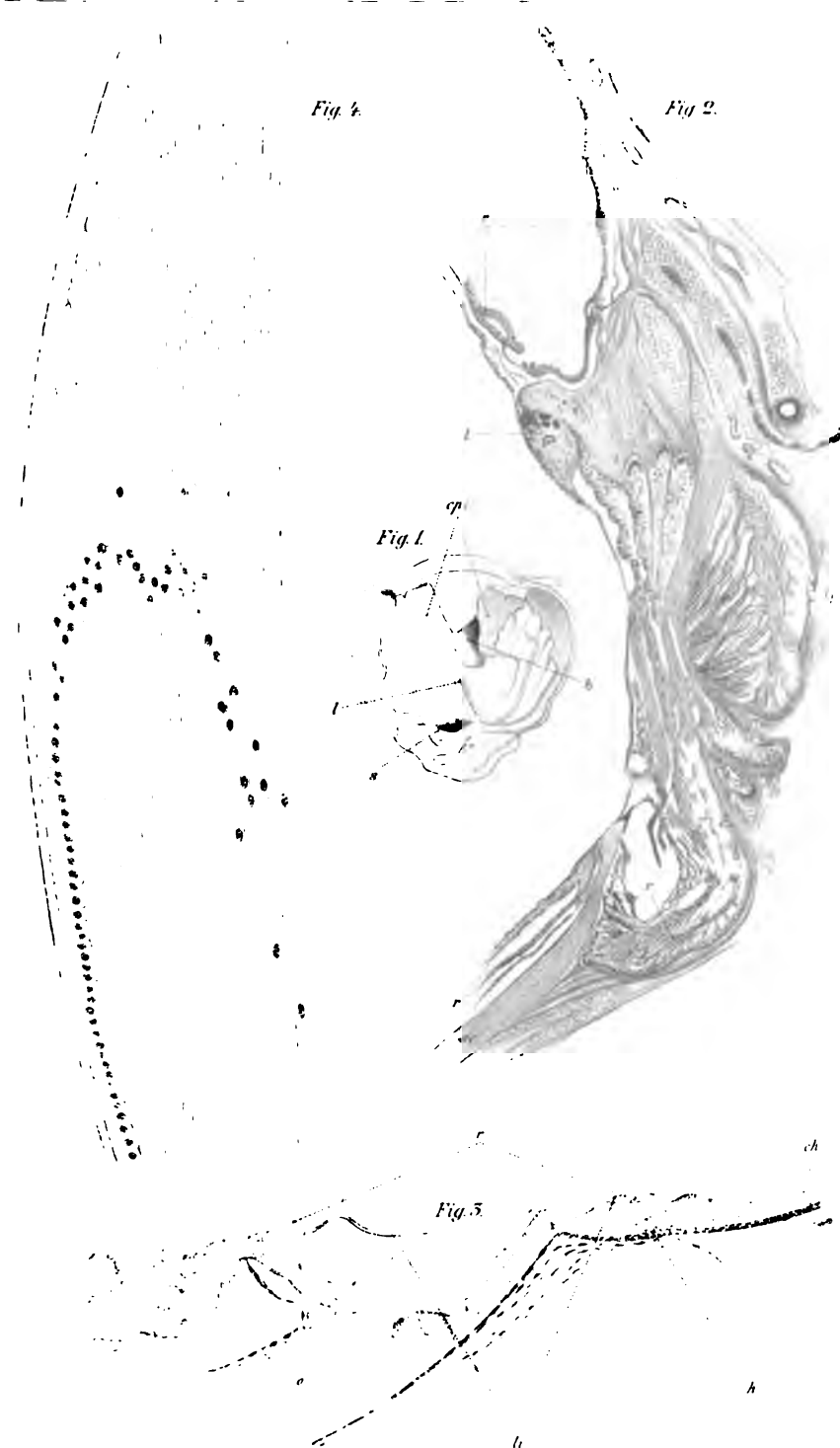
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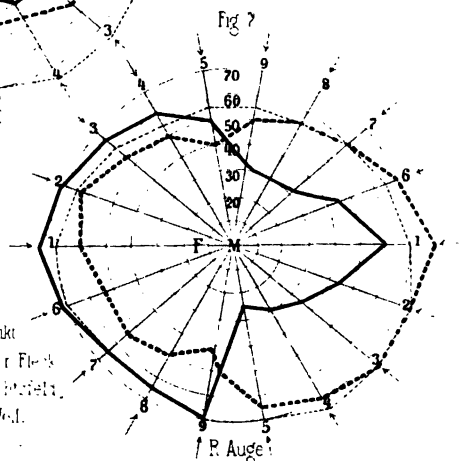
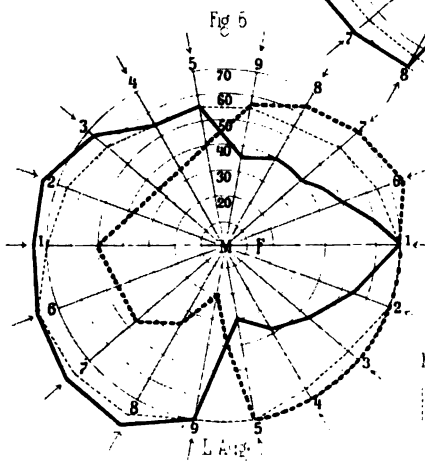
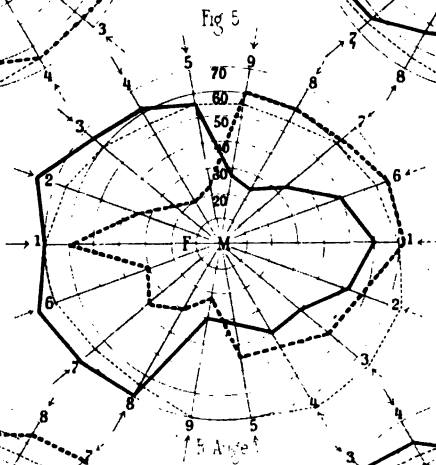
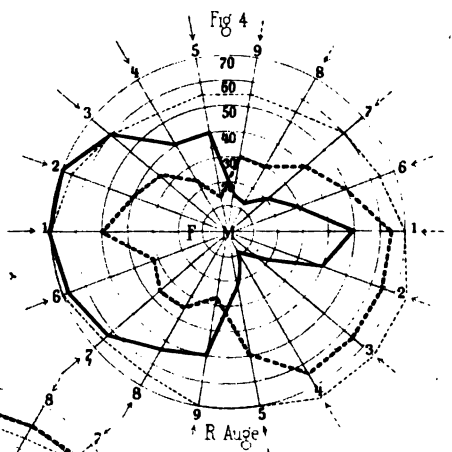
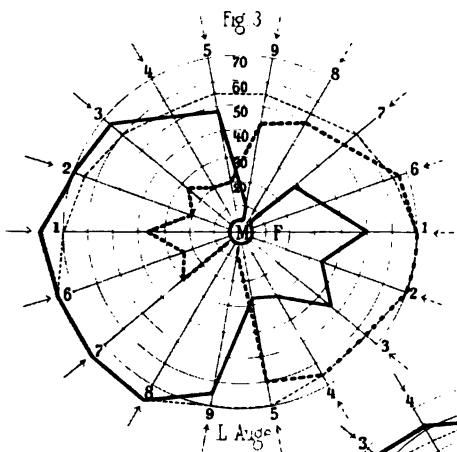
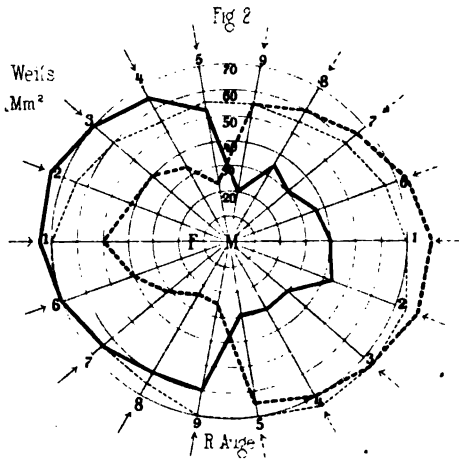
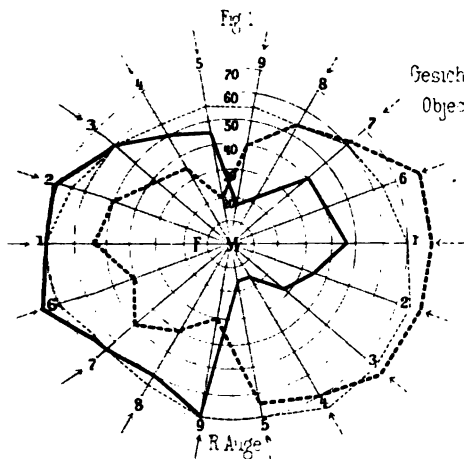
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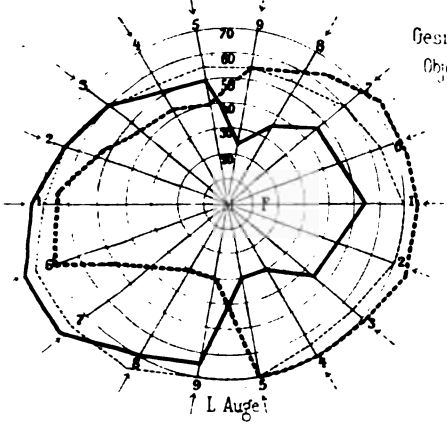
Lith. Anst. v. Wernke & Wernke, Frankfurt





F = Fixationspunkt
M = Maximum des Blicks
Normale Gesichtsfeldgrenze für Weiss

Fig 8



Gesichtsfeld für Weiße
Objektgröße 5 mm²

Fig 9

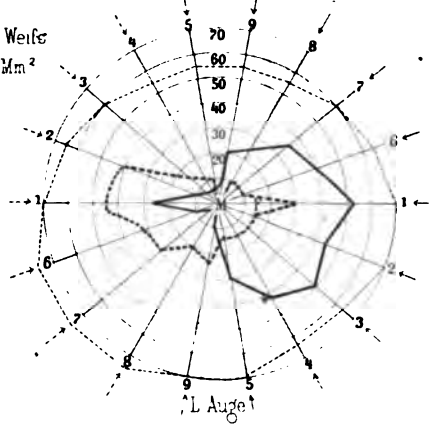


Fig 10

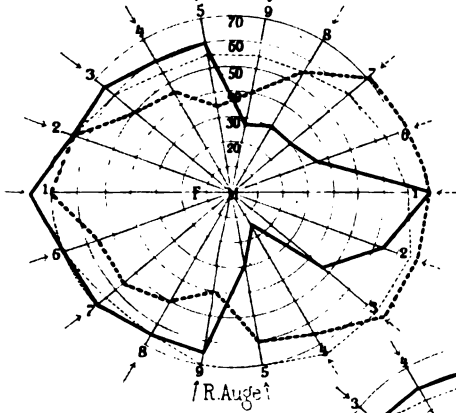


Fig 11

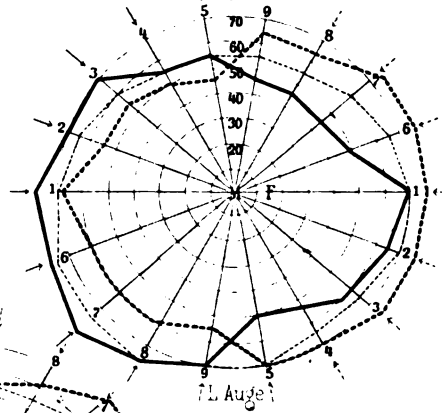


Fig 12

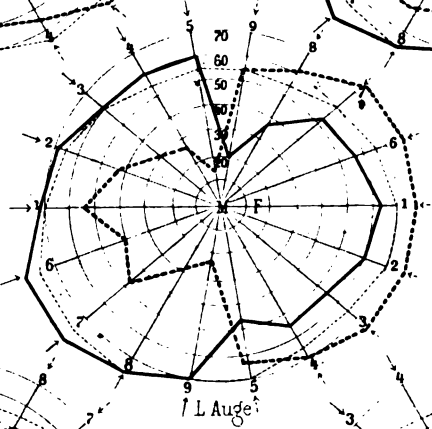


Fig 13

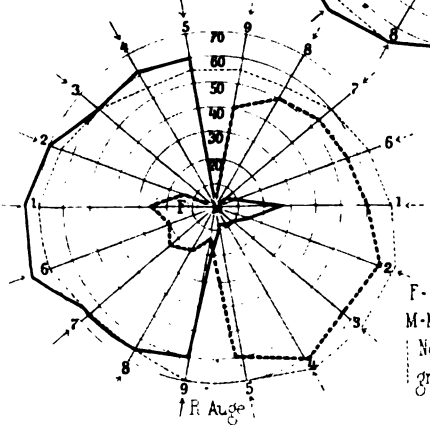
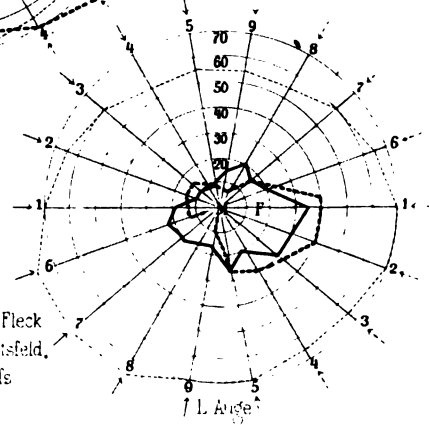
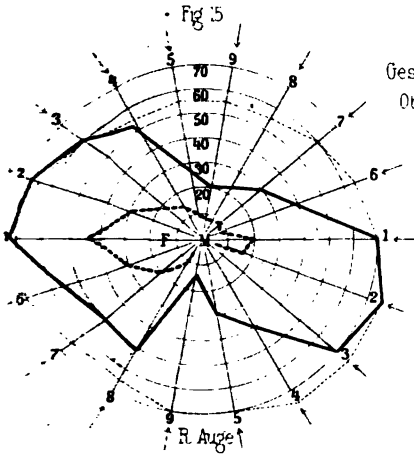


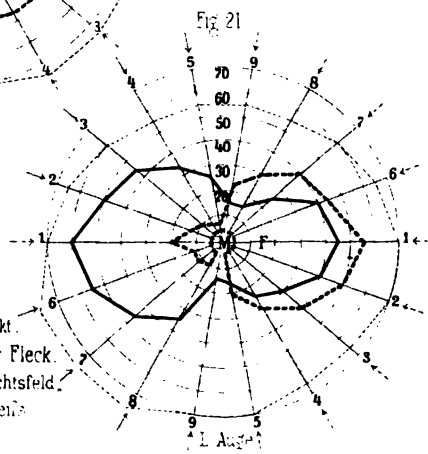
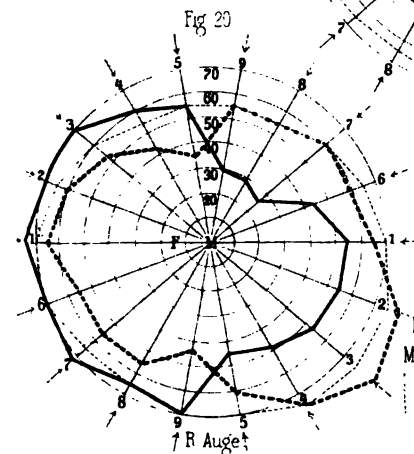
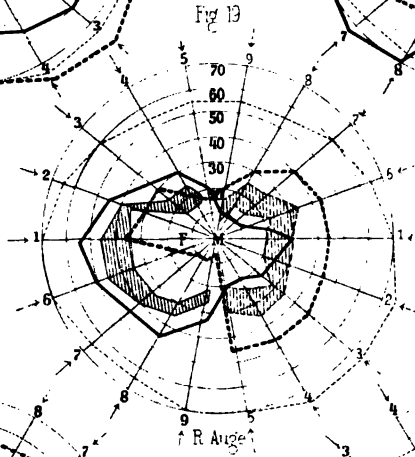
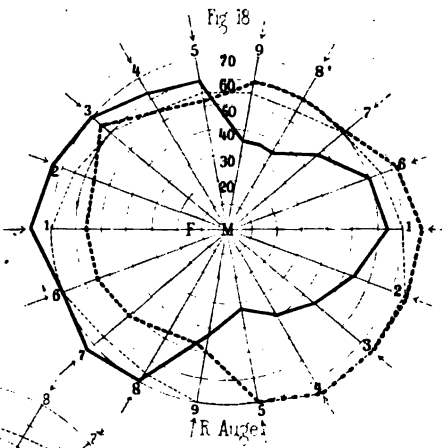
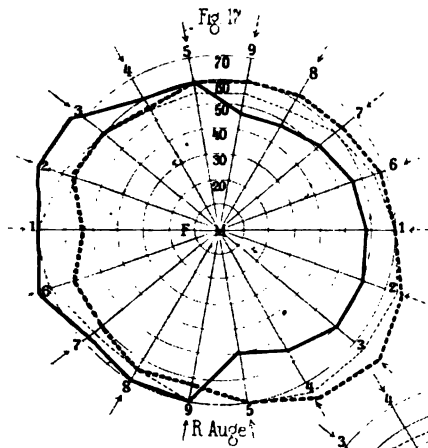
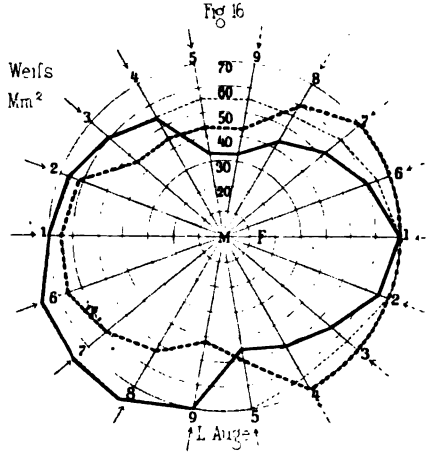
Fig 14



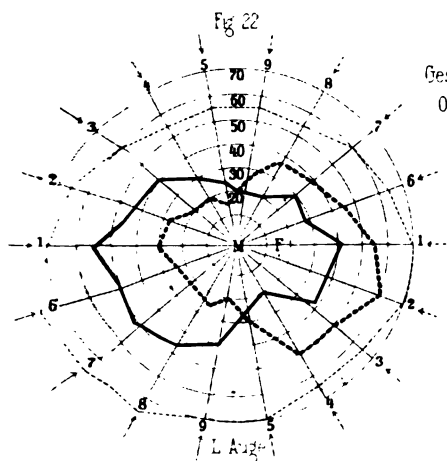
F-Fixationspunkt
M-Mariottescher Fleck
--- Normale Gesichtsfeld-
grenze für Weiße



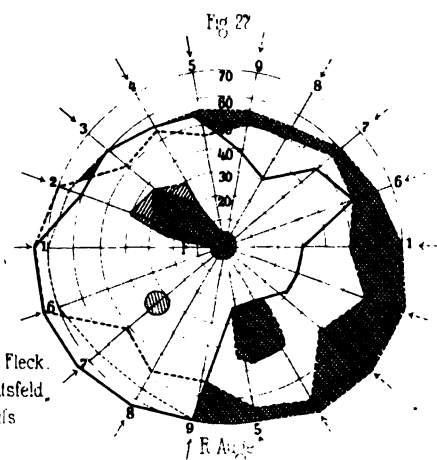
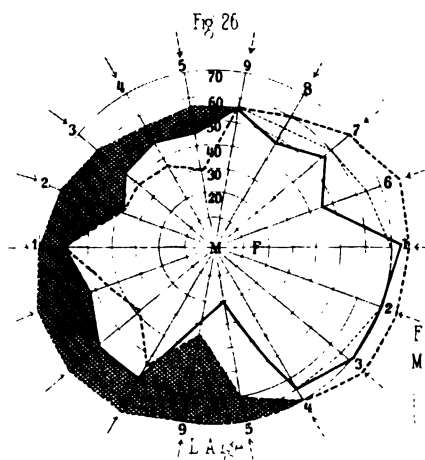
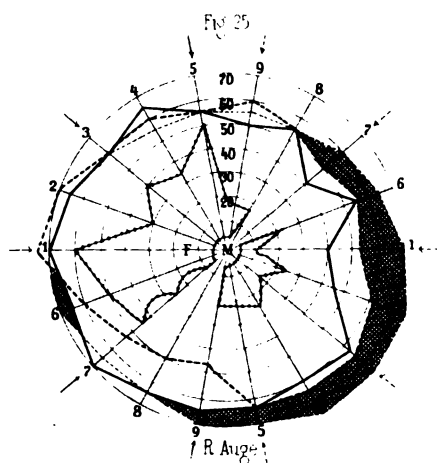
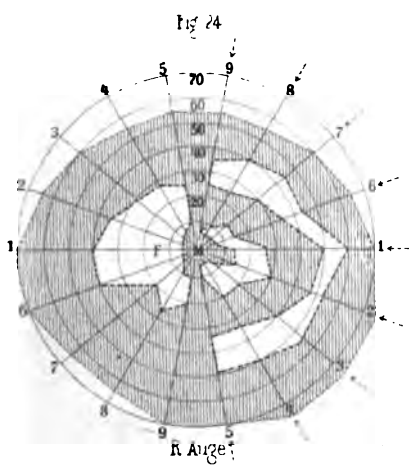
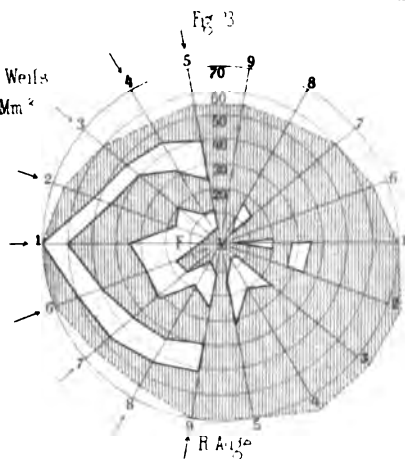
Gesichtsfeld für Weiße
Objektgröße 5 Mm²



F - Fixationspunkt.
M - Mariottescher Fleck.
Normale Gesichtsfeld-
grenze für Weiße



Gesichtsfeld für Weiss
Objektgröße 5 mm



F - Fixationspunkt
M - Mariottescher Fleck.
Normale Gesichtsfeld-
Grenze für Weiss

Fig.1.



Fig.2.



Fig.3.



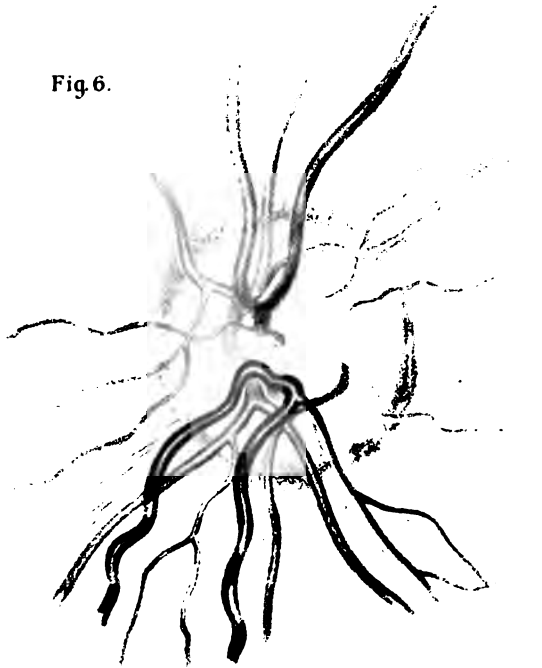
Fig. 5.

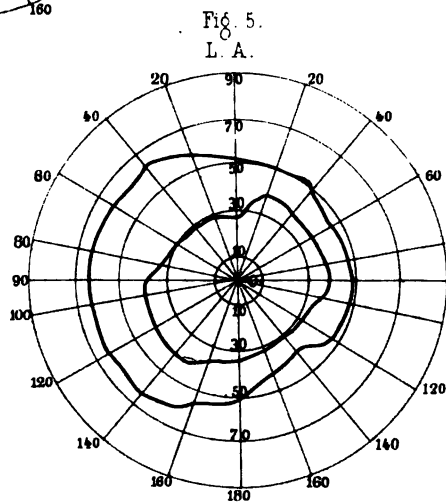
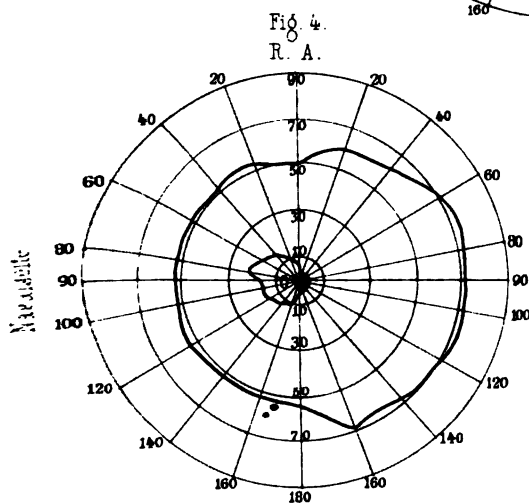
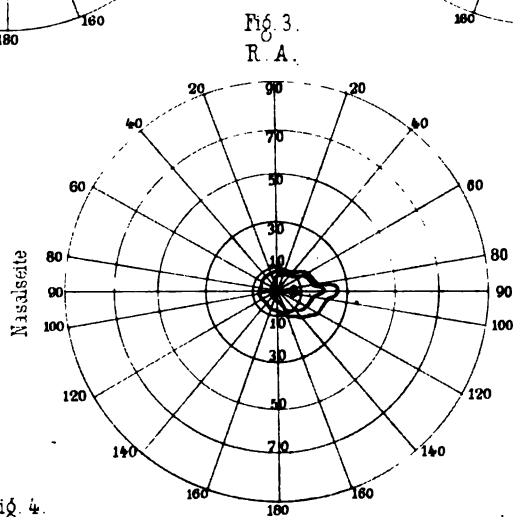
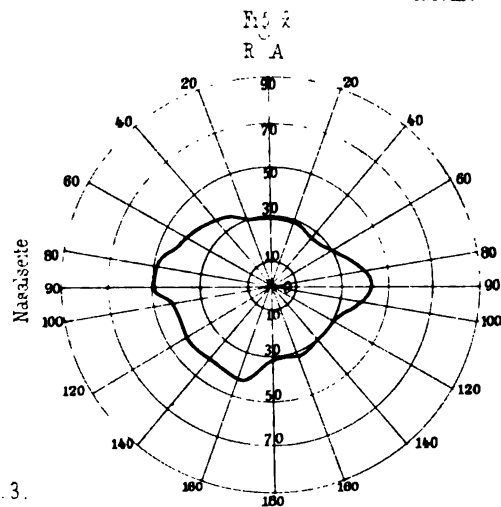
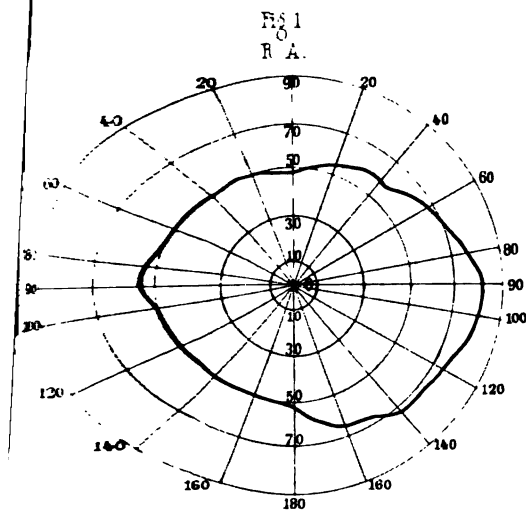


Fig.4.



Fig. 6.





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